

AFRL-ML-WP-TP-2002-401

**ELECTRONIC AND OPTICAL
MATERIALS
Work Unit Directive (WUD) 48**

Dr. Gail J. Brown



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FY88 SCIENTIFIC PUBLICATIONS & PRESENTATIONS

"Neutron Irradiation Effects on the Infrared Absorption of the EL2 Defect in GaAs: New Interpretation for the Intracenter Transition"

M. O. Manasreh, D. W. Fischer, and B. C. Covington, Phys. Rev. B37, 6567 (1988)

"Temperature Dependence of the Figures of Merit for the Blocked Impurity Band Detectors"
F. Szmulowicz, F. Madarasz, and J. Diller, J. Appl. Phys. 63 5583 (1988)

"Synthesis and Characterization of Superconducting YBa₂Cu₃O_{7-x} Material"
B. Kumar, J. D. Wolf, and S. R. Smith, J. Mater. Sci. Lett. 7, 149 (1988)

"Thermal Properties of Semi-Insulating GaAs Dilutely Alloyed with InAs"
M. C. Ohmer, W. C. Mitchel, G. A. Graves, D. E. Holmes, H. Kuwamoto, and P. W. Yu, J. Appl. Phys. 64, 2775 (1988)

"Thermal Recovery of Photoquenched EL2 Infrared Absorption in GaAs"
D. W. Fischer, Phys. Rev. B37, 2968 (1987)

"An Antimony Related Electronic Level in Isovalently Doped Bulk GaAs"
W. C. Mitchel and P. W. Yu, J. Appl. Phys. 62, 4781 (1987)

"Effects of Coherent Scattering on Infrared Absorption in Doped Semiconductors"
P. J. Grigsby and G. J. Brown, AFWAL-TR-88-4205 Technical Report

"GaAs Material / Device Correlation Study"
J. M. King, D. C. Look, S. Dudley, S. Labovitz, and W. C. Mitchel, AFWAL-TR-87-1188 Technical Report

"The Intrinsic Double Acceptor in Undoped Gallium Arsenide"
W. C. Mitchel and D. W. Fischer, 1988 Materials Laboratory Cleary Award

"Deposition of Thin superconducting Films by Pulsed Laser Evaporations"
T. Murray, World Congress on Superconductivity, Houston, TX (1988)

"Iterative Analytical Solution to Nonlinear Diffusion Equation"
D. S. Moroi, D. Boyd, and P. M. Hemenger, Fall Mts. Ohio Section /APS (1988)

"Observation of Differences in the Quenching of the Photo-current in GaAs Containing EL2 and EL0"
W. C. Mitchel, L. S. Rea, and P. W. Yu, Elec. Mater. Conf. Boulder, CO (1988)

"Photoresponse of Ion Implanted Gallium Dopants in Silicon"
G. J. Brown and J. An. Baker, IRIS IR Materials, Menlo Park, CA (1988)

"Barrier Formation in Graded Hg_{1-x}Cd_xTe Heterojunctions Inclucing a Valence Band Offset"
F. L. Madarasz and F. Szmulowicz, IRIS IR Materials, Menlo Park, CA (1988)

"The Influence of Material Parameters on the Temperature Dependence of the Figures of Merit for the Blocked Impurity Band Detectors"

F. Szmulowicz, F. Madarasz, and J. Diller, IRIS IR Materials, Menlo Park, CA (1988)

"High Temperature Superconducting Ceramics: Applicability to Sensors"

P. M. Hemenger, NATO/AGARD Avionics Panel Subcommittee, Paris, France (1988)

"High Temperature Superconducting Ceramics: Applicability to Sensors"

P. M. Hemenger and L. G. Riffey, NAECON National Mtg., Dayton, OH (1988)

8.0 FY89 SCIENTIFIC PUBLICATIONS & PRESENTATIONS

"Photoreflectance Measurements of Unintentional Impurities in Undoped GaAs"

M. Sydor, J. Angelo, W. C. Mitchel, T. W. Haas, and Ming-Yuan Yen

J. Appl. Phys. 66, 156 (1989)

"The EL2 Defect in GaAs: Some Recent Developments" (Invited Review Article)

M. O. Manasreh, D. W. Fischer, and W. C. Mitchel

Phys. Stat. Sol. (b)154, 11 (1989).

"Persistent Photocurrent in Semi-Insulating GaAs and Its Relationship to the Deep Donor EL2"

W. C. Mitchel, David W. Fischer, and M. O. Manasreh

Solid State Commun. 71, 337 (1989).

"Photoresponse of Ion Implanted Gallium Dopants in Silicon"

G. J. Brown and J. A. Baker

Infrared Phys. 29, 43 (1989).

"Noncreation of the EL2 Defect in Neutron-Irradiated GaAs"

M. O. Manasreh and D. W. Fischer

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"Observation of the Second Energy Level of the EL2 Defect in GaAs by the Infrared Absorption Technique"

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"The Flux, Temperature, and Energy Dependence of Dislocation Pinning in Electron-Irradiated Gold"

G. J. Brown, J. W. Hemsky, and H. M. Simpson

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"Photoquenching and Photoinduced-Recovery Properties of the EL2 Defect in GaAs: Evidence Against the Identification of EL2 with the Isolated AsGa Defect"

M. O. Manasreh and D. W. Fischer

Phys. Rev. B39, 13001 (1989)

"Absence of a Persistent Photocurrent in Undoped Semi-insulating Bridgman GaAs Containing EL2 and Carbon"

W. C. Mitchel

Phys. Rev. B39, 10390 (1989).

"Temperature Dependence of the Photoinduced $\text{EL2}^* \rightarrow \text{EL2}^0$ Recovery Process Observed by Infrared Absorption"

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"Determination of Shallow Minority-Acceptor Concentration in Multiply Doped Silicon"

G. Bambakidis and G. J. Brown

J. Appl. Phys. 65, 3270 (1989).

"Influence of Solute Doping on the High-Temperature Deformation Behavior of GaAs"
S. Guruswamy, R. S. Rai, K. T. Faber, J. P. Hirth, S. McGuigan, R. N. Thomas, and W. Mitchel
J. Appl. Phys. 65, 2508 (1989).

"The Effects of Long-Term Annealing on Superconducting Properties in the Bi-Sr-Ca-Cu-O System"
Asok K. Sarkar, Binod Kumar, I. Maartense, and T. L. Peterson
J. Appl. Phys. 65, 2392 (1989).

"Electron Paramagnetic Resonance Identification in the SbGa Heteroantisite Defect in GaAs:Sb"
M. Baeumler, J. Schneider, U. Kaufmann, W. C. Mitchel, and P. W. Yu
Phys. Rev. B 39, 6253 (1989).

"Electron Irradiation Effects on the Infrared Absorption Properties of the EL2 Defect in GaAs"
M. O. Manasreh and D. W. Fischer
Phys. Rev. B 39, 3871 (1989).

"Observation of Differences in the Quenching of the Photo-current in GaAs Containing EL2 and EL0"
W. C. Mitchel, Laura S. Rea, and P. W. Yu
J. Elec. Matls. 18, 209 (1989).

"Persistent Photo-Current in Semi-Insulating, Undoped GaAs and Its Relationship to the Deep Donor EL2"
W. C. Mitchel, D. W. Fischer, and M. O. Manasreh
Solid State Commun. 71, 337 (1989).

"Infrared Absorption Properties of the EL2 and the Isolated AsGa Defects in Neutron-Transmutation Doped GaAs: Generation of an EL2-like Defect"
M. O. Manasreh and D. W. Fischer
Phys. Rev. B 39, 3239 (1989)

"Photoluminescence Bands of Deep Centers in Neutron-Transmutation Doped GaAs"
M. O. Manasreh and S. M. Mudare
Semicond. Sci. Technol. 4, 435 (1989)

"Calculation of the Lattice Thermal Conductivity in GaAs-InAs Alloys and Comparison with Experiment"
Frank Szmulowicz, Frank L. Madarasz, Paul G. Klemens, and Jeffrey Diller
J. Appl. Phys. 66, 252 (1989).

"Observation of a Deep Level Due to In Doping in p-type GaAs"
S. R. Smith, A. O. Evwaraye, and W. C. Mitchel
J. Appl. Phys. 65, 1130 (1989).

"Ultrasonic Attenuation Peaks Near the Diffuse Transition Temperature in Solid Electrolytes with Fluorite Structure"
M. O. Manasreh, D. O. Pederson, and T. S. Aurora
Proc. Mat. Res. Soc. 135, 309 (1989).

- "Optical Absorption of the Isolated AsGa Antisite and an EL2-Like Defect in Neutron-Transmutation Doped GaAs"
M. O. Manasreh and D. W. Fischer
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- "Linearity of Direct Injection in an InSb Photodiode/Si Charge-Coupled Device Imager"
F. K. Hopkins and J. T. Boyd
Optical Engineering 27, 701 (1988).
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M. O. Manasreh, P. F. McDonald, S. A. Kivlighn, J. T. Minton, and B. C. Covington
Solid State Commun. 65, 1267 (1988).
- "Infrared Absorption of Electron Irradiation-Induced Deep Defects in Semi-Insulating GaAs"
M. O. Manasreh and D. W. Fischer
Appl. Phys. Lett. 53, 2429 (1988)
- "The Effect of Shallow Residual Impurities on the Hopping Activation Energy in Semiconductors"
Frank Szmulowicz and Kenneth T. Bloch
Phys. Rev. B 38, 8480 (1988).
- "The Effect of a Valence-Band Offset on Barrier Formation in Graded $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$ Heterojunctions"
Frank L. Madarasz and Frank Szmulowicz
J. Appl. Phys. 64, 6373 (1988).
- WRDC-TR-89-5015, GaAs Material/Device Correlation Study (Inhouse, Limited Distribution).
- "Effects of Different Fabrication Techniques on the Yttrium-Barium-Copper Oxide High Temperature Superconductor"
Paul A. Rhea
AFIT/GE/ENG/88D-42
- "EL2 and Other Deep Donors in Semi-Insulating GaAs"
D. W. Fischer and W. C. Mitchel, 1989 Cleary Award (Finalists).
- "Measurement of Nonlinear Optical Properties of Oxide Thin Films"
D. E. Zelmon
Tennessee Valley Chapter of the American Vacuum Society, Oak Ridge, TN (May 1989) (Invited)
- "A Monte Carlo Model of Thin Film Growth"
D. L. Dorsey and F. Szmulowicz
1989 Spring Meeting of Ohio Section/APS, Oxford, OH (April 1989).
- "Modeling of MBE Growth of III-V Semiconductors: Literature Review and Preliminary Model Results"
D. L. Dorsey
Invited Lecture, Washington University, St. Louis, MO (March 1989).

"Equilibrium Barrier Formation in p-on-N and P-on-n Graded HgCdTe Heterojunctions"

Frank L. Madarasz and Frank Szmulowicz

SPIE Technical Symposia on Aerospace Sensing, Orlando, FL (March 1989).

"Recent Experimental Measurements and Analyses of the Native EL2 Defect in GaAs"

M. O. Manasreh

Fall Meeting of the Materials Research Society, Boston, MA (Nov-Dec 1988).

"Examination of the Effects of Different Fabrication Techniques on the Barium-Yttrium-Copper-Oxide High Temperature Superconductor"

P. Rhea, Y. Yeo, R. Hengehold, P. Hemenger, I. Maartense, T. Peterson, M. Battison, and R. Kerans
1988 Fall Meeting of Ohio Section/APS, Toledo, OH (Oct 1988).

8.0 FY90 SCIENTIFIC PUBLICATIONS & PRESENTATIONS

8.1 Publications

1. Michael Sydor, Neal Jahren, W. C. Mitchel, W. V. Lampert, T.W. Haas, M. Y. Yen, S. M. Mudare, and D. H. Tomich, "Photoreflectance of $Al_xGa_{1-x}As$ and $Al_xGa_{1-x}As/GaAs$ Interfaces and High-Electron-Mobility Transistors", *J. Appl. Phys.* 67, 7423 (1990).
2. Michael Sydor, James Angelo, Jerome J. Wilson, W. C. Mitchel, and M. Y. Yen, "Photoreflectance from GaAs and GaAs/GaAs Interfaces", *Phys. Rev. B* 40, 8473 (1989).
3. C. R. Abernathy, S. J. Pearton, M. O. Manasreh, D. W. Fischer, and D. N. Talwar, "Incorporation of Carbon in Heavily Doped $Al_xGa_{1-x}As$ Grown by Metalorganic Molecular Beam Epitaxy", *Appl. Phys. Lett.* 57, 294 (1990).
4. W. C. Mitchel, D. W. Fischer, Laura S. Rea, and P. W. Yu, "Anomalous Photoquenching in Semi-insulating GaAs Attributed to the Presence of the Deep Donor ELO", *Phys. Rev. B* 40, 8431 (1989).
5. M. O. Manasreh and D. W. Fischer, "Quenching and Recovery Characteristics of the EL2 Defect in GaAs Under Monochromatic-Light Illumination", *Phys. Rev. B* 40, 11756 (1989).
6. W. C. Mitchel and Ronald E. Perrin, "Temperature Dependence of the Persistent Photocurrent in Czochralski Gallium Arsenide", *Phys. Rev. B* 41, 12086 (1990).
7. S. Ravipati, P. W. Yu, B. E. Taylor, and W. C. Mitchel, "Photoreflectance Measurements of Indium Content in Semi-insulating Indium-alloyed GaAs Bulk Substrates", *Proc. SPIE Int'l Conf. on Modulation Spectroscopy* 1286, 66 (1990).
8. M. O. Manasreh and G. J. Brown, "The Double Donor Issue of the EL2 Defect in GaAs", in Impurities, Defects and Diffusion in Semiconductors: Bulk and Layered Structures, *Proc. Materials Research Soc.* 163, 809 (1990).
9. M. O. Manasreh and D. W. Fischer, "Recovery from the Metastable EL2 Defect in GaAs Under Monochromatic Light Illumination", *Proc. Materials Research Soc.* 163, 827 (1990).
10. G. J. Brown and W. C. Mitchel, "Mid-infrared Spectral Photoresponse of Semi-insulating GaAs", *Proc. Materials Research Soc.* 163, 157 (1990).
11. D. W. Fischer and M. O. Manasreh, "The Effect of Charge State on the Local Vibrational Mode Absorption of the Carbon Acceptor in Semi-Insulating GaAs", *J. Appl. Phys.* 68, 2504 (1990).
12. M. O. Manasreh, W. C. Mitchel, and D. W. Fischer, "Far-infrared Absorption from Shallow Acceptors and its Relationship to the Persistent Photocurrent in Semi-insulating GaAs", *Semicond. Sci. Technol.* 5, 994 (1990).
13. P. W. Yu, S. Ravipati, B. E. Taylor, and W. C. Mitchel, "Photoreflectance Measurements of Indium Content in Indium-Alloyed Semi-insulating GaAs Substrates", *J. Appl. Phys.* 67, 1471 (1990).
14. T. L. Peterson, F. Szmulowicz, and P. M. Hemenger, "Electrical Transport Analysis of Ultra-Pure Silicon", *J. Cryst. Growth* 106, 16 (1990).
15. Frank Szmulowicz and Frank L. Madaras, "Valence Band Barrier Formation in Graded $Hg_{1-x}Cd_xTe$ Heterojunctions With a Valence Band Offset Included", *J. Appl. Phys.* 66, 3082 (1989).

16. Rabi S. Bhattacharya, P. B. Kosek, and T. Peterson, "High T_c Superconductor Multilevel Structures Formed with Ta_2O_3 Spacer Layers", Proc. Materials Research Soc. 169 (1990).
17. J. A. Schultz and P. T. Murray, "Surface Analysis of H, C, O, Y, Ba, and Cu on Pressed and Laser Evaporated $YBa_2Cu_3O_7$ ", in High T_c Superconducting Thin Films, Devices, and Applications, G. Margaritondo, R. Joynt, and M. Oueillion, eds., American Institute of Physics, New York (1989).
18. I. Bransky, J. Bransky, I. Maartense, and T. L. Peterson, "Dependence of Transport Critical Current Density on Sample Size for Ceramic $RBa_2Cu_3O_{7-x}$ ($R=Y, Ho, Gd$)", J. Appl. Phys. 66, 5510 (1989).
19. Asok K. Sarkar, I. Maartense, Binod Kumar, and T. L. Peterson, "Effect of Sintering Temperature on the Superconductive Properties of Bi(Pb)-Sr-Ca-Cu-O Ceramics", Supercond. Sci. Technol. 3, 199 (1990).
20. Asok K. Sarkar, I. Maartense, T. L. Peterson, and Binod Kumar, "Preparation and Characterization of Superconducting Phases in the Bi(Pb-Sr-Ca-Cu-O) System", J. Appl. Phys. 66, 3717 (1989).
21. R. E. Perrin, "Computer Controlled Cryogenic Temperature Controller", WRDC-TR-89-4140 (In-house).

8.2 Presentations

1. P. G. Schunemann, T. M. Pollak, P. A. Budni, H. H. Zenzie, and F. K. Hopkins, "Synthesis and Single Crystal Growth of $ZnGeP_2$ ", Conf. on Crystal Growth, Vail, CO (July 1990).
2. P. G. Shunemann, T. M. Pollak, P. A. Budni, H. H. Zenzie, and F. K. Hopkins, "Growth and Characterization of $ZnGeP_2$ for Optical Parametric Oscillator Applications", Fifth Topical Meeting on Advanced Solid-State Lasers, Salt Lake City, UT (March 1990).
3. S. Ravipati, P. W. Yu, B. E. Taylor, and W. C. Mitchel, "Photoreflectance Measurements of Indium Content in Semi-Insulating Indium-alloyed GaAs Bulk Substrates", Int'l Conf. on Modulation Spectroscopy, SPIE, San Diego, CA (March 1990).
4. Frank Szmulowicz, M. O. Manasreh, D. W. Fischer, F. Madarasz, K. R. Evans, E. Stutz, and T. Vaughan, "Temperature Dependence of Intersubband Absorption in a Barrier-Doped GaAs/ $Al_{0.3}Ga_{0.7}As$ Quantum Well Structure", 5th Int'l Conf. on the Physics of Electro-Optic Microstructures and Microdevices, Heraklion, Crete (July-Aug 1990).
5. D. L. Dorsey and F. Szmulowicz, "A Monte Carlo Model of Thin Film Growth by Molecular Beam Epitaxy", 1989 Annual Meeting of the AIChE, San Francisco, CA (Nov 1989).
6. K. A. Pandelisev, R. B. Bult, W. C. Mitchel, S. Felch, G. Maracas, and D. Johnson, "EL2 and 0.42 eV Level Generation During Bulk Crystal Annealing", 6th Conf. on Semi-Insulating III-V Materials, Toronto (May 1990).
7. G. J. Brown and W. C. Mitchel, "Mid-infrared Spectral Photoresponse of Semi-insulating GaAs", MRS Fall Meeting, Boston, MA (Nov 1989).
8. M. O. Manasreh and G. J. Brown, "The Double Donor Issue of the EL2 Defect in GaAs", MRS Fall Meeting, Boston, MA (Nov 1989).

9. M. O. Manasreh and D. W. Fischer, "Recovery from the Metastable EL2 Defect in GaAs Under Monochromatic Light Illumination," MRS Fall Meeting, Boston, MA (Nov 1989).
10. T. L. Peterson, F. Szmulowicz, and P. M. Hemenger, "Electrical Transport Analysis of Ultra-Pure Silicon" (Invited), Third Workshop on Purification of Materials for Crystal Growth and Glass Processing, Orlando, FL (Oct-Nov 1989).
11. D. L. Dorsey, P. A. Ramachandran, and M. P. Dudukovic, "A Boundary Layer Analysis of Oxygen Evaporation from a Czochralski-Silicon Melt", 1989 Meeting of the AIChE, San Francisco, CA (Nov 1989).
12. D. L. Dorsey, P. A. Ramachandran, and M. P. Dudukovic, "Oxygen Transport in Czochralski Silicon Crystal Growth", 1989 Meeting of the AIChE, San Francisco, CA (Nov 1989).
13. P. M. Hemenger, T. L. Peterson, R. Fletcher, I. Maartense, P. T. Murray, and D. W. Chung, "Fabrication and Characterization of High Temperature Superconducting Thin Films for Sensors and Electronics", NATO/AGARD Mtg. on Applications of Superconductivity to Avionics, Bath, U.K. (May 1990).
14. D. W. Chung, T. L. Peterson, R. Fletcher, P. M. Hemenger, I. Maartense, and P. T. Murray, "Electrical and Magnetic Analysis of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ Superconducting Films Grown by Laser Ablation", Conf. on the Science and Technology of Thin Film Superconductors, Denver, CO (May 1990).
15. Rabi S. Bhattacharya, Peter B. Kosel, and T. Peterson, "High T_c Superconductor Multilevel Structures Formed with Ta_2O_3 Spacer Layers", MRS Fall Meeting, Boston, MA (Nov 1989).
16. R. E. Perrin and S. B. Fairchild, Laboratory Applications of Artificial Intelligence: An Expert System for the Analysis of Impurities in Electronic Materials (1990 Schwartz).

9.0 FY90 INTERACTIONS

9.1 WITH OTHER WUDs

A major portion of the WUD#48 program continued to focus on materials grown in the ML/MBE machine in WUD#50, *Surface and Interface Properties*. This includes all aspects of materials design, process modeling, and characterization.

Integral to the WUD#50 collaboration is participation with WUD#54, *Manufacturing Research*, on the project to apply AI to MBE material processing. WUD#48 supplies experimental data and expert consultation.

Part of the non-linear optical (NLO) materials research is in collaboration with WUD#26, *Laser Hardened Optical Materials*, and WUD#43, *Polymeric Materials*. These groups are growing organic thin films inhouse and WUD#48 is participating in their characterizations.

The inhouse project applying artificial intelligence (AI) to an experimental system was developed with support from WUD#26. A small activity continues as the final graphics software is tuned-up and the documentation is completed.

9. M. O. Manasreh and D. W. Fischer, "Recovery from the Metastable EL2 Defect in GaAs Under Monochromatic Light Illumination," MRS Fall Meeting, Boston, MA (Nov 1989).
10. T. L. Peterson, F. Szmulowicz, and P. M. Hemenger, "Electrical Transport Analysis of Ultra-Pure Silicon" (Invited), Third Workshop on Purification of Materials for Crystal Growth and Glass Processing, Orlando, FL (Oct-Nov 1989).
11. D. L. Dorsey, P. A. Ramachandran, and M. P. Dudukovic, "A Boundary Layer Analysis of Oxygen Evaporation from a Czochralski-Silicon Melt", 1989 Meeting of the AIChE, San Francisco, CA (Nov 1989).
12. D. L. Dorsey, P. A. Ramachandran, and M. P. Dudukovic, "Oxygen Transport in Czochralski Silicon Crystal Growth", 1989 Meeting of the AIChE, San Francisco, CA (Nov 1989).
13. P. M. Hemenger, T. L. Peterson, R. Fletcher, I. Maartense, P. T. Murray, and D. W. Chung, "Fabrication and Characterization of High Temperature Superconducting Thin Films for Sensors and Electronics", NATO/AGARD Mtg. on Applications of Superconductivity to Avionics, Bath, U.K. (May 1990).
14. D. W. Chung, T. L. Peterson, R. Fletcher, P. M. Hemenger, I. Maartense, and P. T. Murray, "Electrical and Magnetic Analysis of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ Superconducting Films Grown by Laser Ablation", Conf. on the Science and Technology of Thin Film Superconductors, Denver, CO (May 1990).
15. Rabi S. Bhattacharya, Peter B. Kosel, and T. Peterson, "High T_c Superconductor Multilevel Structures Formed with Ta_2O_3 Spacer Layers", MRS Fall Meeting, Boston, MA (Nov 1989).
16. R. E. Perrin and S. B. Fairchild, Laboratory Applications of Artificial Intelligence: An Expert System for the Analysis of Impurities in Electronic Materials (1990 Schwartz).

8.0 FY91 SCIENTIFIC PUBLICATIONS & PRESENTATIONS

8.1 Publications

"Response to 'Comment on 'The Effect of Charge State on the Local Vibrational Mode Absorption of the Carbon Acceptor in Semi-insulating GaAs' [J. Appl. Phys. 68, 2504 (1990)]'"

D.W. Fischer and M.O. Manasreh
J. Appl. Phys. 69, 6733 (1991)

"Molecular Beam Epitaxial Growth of Epitaxial Barium Silicide, Barium Oxide and Barium Titanate on Silicon"

R.A. McKee, F.J. Walker, J.R. Conner, E.D. Specht, and D.E. Zelmon
Appl. Phys. Lett. 59, 782 (1991)

"Calculation of Gallium-Arsenic-Metal Phase Diagrams"

James D. Scofield, J. E. Davison, and S. R. Smith

Chemical Perspectives of Microelectronic Materials II, eds. L.H. Dubois, LV. Interrante, M.E. Gross, and K.F. Jensen, MRS Meeting, 204, E5.35 (1990).

"Temperature Dependence of the Linewidth and Peak Position of the Intersubband Infrared Absorption in GaAs/Al_{0.3}Ga_{0.7}As Quantum Wells"

M. O. Manasreh, C. E. Stutz, K. R. Evans, F. Szmulowicz, and D. W. Fischer

Long-Wavelength Devices, Materials and Processes, ed. by A. Katz, R.M. Biefeld, R.K. Malik, and R.L. Gunshor, Proc. MRS Meeting (Dec 1990).

"A Shubnikov-de Haas Study of Intersubband Scattering in MOCVD Grown GaAs/AlGaAs Heterostructures"

I. Lo, W.C. Mitchel, R.E. Perrin, R.L. Messham, and M-Y. Yen

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"Anomalous Behavior of Cyclotron Resonance in GaAs/Al_{0.28}Ga_{0.72}As High Electron Mobility Transistor Structures"

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"The Extent of Critical Temperature Variations of the Superconducting Phases in the Bi-Pb-Sr-Ca-Cu-O System"

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"Electrical and Magnetic Analysis of YBa₂Cu₃O_{7-x} Superconducting Films Grown by Laser Ablation"

D. W. Chung, T. L. Peterson, R. Fletcher, P. M. Hemenger, I. Maartense, and P. T. Murray

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8.2 Presentations

(1991 Schwartz) "Nonlinear Optical Materials Development Strategy", F.K. Hopkins (Finalist).

(1991 Cleary) "Precision Transport Analysis of Ultra-Pure Silicon", T.L. Peterson and P.M. Hemenger (Finalists).

"XPS Characterization of Low Temperature MBE Grown GaAs (111) Layer"
D.I. Tomich, M-Y. Yen, M.A. Capano, K.G. Eyink, W.C. Mitchel, and T.W. Haas
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"Local-mode Spectroscopy and Model Study for Assessing the Role of Light Defects in III-V Compound Semiconductors"

D.N. Talwar, M.O. Manasreh, D.W. Fischer, S.J. Pearton, and G. Matous

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"Intersubband IR Absorption in GaAs/Al_{0.3}Ga_{0.7}As Multiple Quantum Well"

M.O. Manasreh, F. Szmulowicz, T. Vaughan, K.R. Evans, C.E. Stutz

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"Effective Masses of Two Dimensional Electron Gas in GaAs/AlGaAs Heterostructures"

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"Cyclotron Resonance in GaAs/AlGaAs HEMT Structure"

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"Monte Carlo Simulation of Random-Deposition Thin Film Epitaxy"

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"Site Selective Doping in YBa₂(Cu_{1-x}M_x)₃O_{7-d} with M=Fe, Co"

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"A Shubnikov-de Haas Study of Intersubband Scattering in MOCVD Grown GaAs/AlGaAs Heterostructures"

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"Hall Effect Characterization of High Purity Silicon"

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8.0 FY92 SCIENTIFIC PUBLICATIONS & PRESENTATIONS

8.1 Publications

"Indirect Photoreflectance from High-electron-mobility Transistor Structures"

M. Sydor, J.R. Engholm, M.O. Manasreh, K.R. Evans, C.E. Stutz and W.C. Mitchel
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"Study of GaAs and AlGaAs buried structures by differential photoreflectance spectroscopy"

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"Introduction to Long-Wavelength Infrared Quantum Detectors"

M.O. Manasreh and G.J. Brown

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"Negative Persistent Photoconductivity in the $\text{Al}_{0.6}\text{Ga}_{0.4}\text{Sb}/\text{InAs}$ Quantum Wells"

I. Lo, W.C. Mitchel, M.O. Manasreh, C.E. Stutz and K.R. Evans
Appl. Phys. Lett. 60, 751 (1992)

"Effect of Al composition on the deep level donors of $\text{Al}_x\text{Ga}_{1-x}\text{Sb}/\text{InAs}$ single quantum wells"

Ikai Lo, W. C. Mitchel, C. E. Stutz, K. R. Evans, and M. O. Manasreh
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Mat. Res. Soc. Proc. 262, 893 (1992)

"Shubnikov-de Haas Studies of Negative Persistent Photoconductivity in
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I. Lo, W.C. Mitchel, M.O. Manasreh, C.E. Stutz and K.R. Evans
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"Comment on 'Effect of Many Body Corrections in Intersubband Transitions in GaAs/Al_xGa_{1-x}As Quantum Wells' by B. Jogai, J. Vac. Sci. Technol. B₉, 2473 (1991)"
F. Szmulowicz and M. O. Manasreh
J. Vac. Sci. Technol. B₁₀, 1341 (1992)

"Effective Mass of the 2-dimensional Electron Gas in an Al_{0.6}Ga_{0.4}Sb/InAs Single Quantum Well"
M.O. Manasreh, Godfrey Gumbs, C. Zhang, C.E. Stutz, K.R. Evans, C.A. Bozada, I. Lo, and W.C. Mitchel
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"Intersubband Infrared Absorption in a GaAs/Al_{0.3}Ga_{0.7}As Multiple Quantum Well"
M. O. Manasreh, F. Szmulowicz, T. Vaughan, K. R. Evans, C. E. Stutz and D. W. Fischer
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"Spin-splitting and effective mass of the 2-dimensional electron gas in an Al_{0.6}Ga_{0.4}Sb/InAs single quantum well"
M.O. Manasreh, Godfrey Gumbs, C. Zhang, I. Lo, C.A. Bozada, R. W. Dettmer, C.E. Stutz, K.R. Evans, and W.C. Mitchel
Advanced III-V Compound Semiconductor, Growth, Processing and Devices, Mat. Res. Soc. Symp. Proc. 240, 765 (1992)

"Local Mode Spectroscopy of Proton- and Deuteron Implanted InP"
D.W. Fischer, M.O. Manasreh, and G. Matous
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"Deep Levels in Undoped Horizontal Bridgman GaAs by Fourier Transform Photoconductivity and Hall Effect"
W.C. Mitchel, Gail J. Brown, Laura S. Rea, and S.R. Smith
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U.B. Ramabadran, D.E. Zelmon, and G.C. Kennedy
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Angela L. McPherson
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"Nonlinear Optical Materials in the Air Force's Materials Directorate"
F.K. Hopkins, B.A. Reinhardt, and R.L. Crane
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"Limit of Superconductivity in Silver/Superconductor Metal-Matrix Composites Prepared with Bi-Pb-Sr-Ca-Cu-O Ceramic Powders"
A.K. Sarkar, I. Maartense, and T.L. Peterson,
J. of Matls. Res., 7, 1672 (1992)

"Fabrication and Electrical Properties of Ceramic Superconductor/Polymer Composites"

A.K. Sarkar and T.L. Peterson

Polymer Eng. and Sci. 32, 305 (1992)

"Transport Properties of $\text{YBa}_2\text{CuO}_{7-x}$ Thin films formed by Plasma Metalorganic Chemical Vapor Deposition at Reduced Temperatures"

J. Zhao, P. Norris, T. L. Peterson, I. Maartense, C. S. Chern, P. Lu, E. Kear, Y. Q. Li and B. Gallois
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"Study of Relaxation Effects in the Lead-Doped Bi-Sr-Ca-Cu-O System"

G. Kozlowski, A.K. Sarkar, C.E. Oberly, R. Spyker, I. Maartense, T.L. Peterson, and J.C. Ho
Advances in Cryogenic Engineering (Materials) 38B, Ed. by F.R. Fickett and R.P. Reed, Plenum Press, 1147 (1992)

"Rain Impact Testing of Durable Coatings on Water Clear ZnS"

John A. Detrio

Proc. SPIE International Symposium on Optical Applied Science and Engineering, Window and Dome Technologies and Materials III (1992)

8.2 Accepted for Publication

"DLTS and Admittance Spectroscopy of $\text{Si}_{1-x}\text{Ge}_x/\text{Si}$ Grown by Gas Source Molecular Beam Epitaxy"

S. H. Li, P. K. Bhattacharya, S. R. Smith and W. C. Mitchel

Proc. Twelfth North American Conf. on MBE

"Deep Levels in Undoped $\text{Si}_{1-x}\text{Ge}_x$ Grown by Gas-Source Molecular Beam Epitaxy"

S.H. Li, P.K. Bhattacharya, S.W. Chung, S. R. Smith and W.C. Mitchel

Electronic Mat. Lett.

"Growth and Photoluminescence of Liquid Phase Electroepitaxially Grown GaSb and GaInAsSb on GaSb "

S. Iyer, S. Hegde, Ali Abdul-Fadl, K. K. Bajaj and W. Mitchel

Physical Review B

"MBE Growth Surface Roughening Kinetics of Ge (001) - A Theoretical Study"

R. Venkatasubramanian and D. L. Dorsey

J. of Vac. Sci. and Tech. B

"A Shubnikov-de Haas Study in the Strained $\text{Al}_{0.6}\text{Ga}_{0.4}\text{Sb}/\text{InAs}/\text{Al}_{0.6}\text{Ga}_{0.4}\text{Sb}$ Quantum Wells"

Ikai Lo, W.C. Mitchel, M.O. Manasreh, C.E. Stutz, and K.R. Evans

Proc. SOTAPCOCS XV (Oct 1991)

"Calculation and Measurement of the Electron Density and Temperature Dependence of the Intersubband Absorption in n-type $\text{GaAs}/\text{Al}_{0.3}\text{Ga}_{0.7}\text{As}$ Quantum Well"

F. Szmulowicz, T. Vaughan, M. O. Manasreh and C. E. Stutz

Proc. of the 21st International Conference on the Physics of Semiconductors, Beijing, China August 1992

"Isochronal Annealing of Local Vibrational Modes in Proton- and Deuteron-Implanted InP"

D.W. Fischer, M.O. Manasreh and G. Matous

J. Appl. Phys.

"Infrared Absorption in Proton- and Deuteron Implanted Semi-Insulating InP:Fe"

D.W. Fischer, M.O. Manasreh, G. Matous, and S.J. Pearton

Proc. of the 7th Conf. on Semi-Insulating III-V Materials, Ixtapa, Mexico, (Apr. 1992)

"Optical Waveguides Fabricated by Ion-implantation of Si⁺ and N⁺ in SiO₂ : A Raman Investigation"
U. B. Ramabadran, H. E. Jackson and J. T. Boyd
Optics Letters

"Optical Anisotropy of Polymeric Films Measured by Waveguide Propagation Mode Determination"
S.J. Bai, R.J. Spry, D.E. Zelmon, U. Ramabadran, and J. Jackson
J. of Polymer Sci., Phys. Sec.

"Heat Transport Through MBBA due to Induced Electrohydrodynamic Motion"
R.R. Biggers, J. Rish III, and R. Fuller
J. Mol. Crys.-Liq. Crys.

8.3 Submitted for Publication

"DLTS and Admittance Spectroscopy of Si_{1-x}Ge_x/Si Grown by Gas Source Molecular Beam Epitaxy"
S. H. Li, P. K. Bhattacharya, S. R. Smith and W. C. Mitchel
J. Electrochem. Soc.

"The ROHF Extension of the Quantum Theory of Valence, Bonding and the Statistical Spin Population Analysis"
Jorge A. Medrano, R.B. Bochicchio and S.G. Das
J. Phys B

"Effect of Deep Levels on the C-V Profile of GaAs/AlGaAs Heterojunctions"
Andrew O. Evvaraye, S.R. Smith, and M-Y. Yen
J. Electronic Mat.

"Photoluminescence Study of Liquid Phase Electroepitaxially Grown GaInAsSb on (100) GaSb"
S. Iyer, S. Hegde, K.K. Bajaj, Ali Abul-Fadl, and W.C. Mitchel
Appl. Phys. Lett

"ZnGeP₂ Grown by the Liquid Encapsulated Czochralski Method"
H.M. Hobgood, T. Henningsen, R.N. Thomas, R.H. Hopkins, M.C. Ohmer, W.C. Mitchel, D.W. Fischer,
F.K. Hopkins, and S.M. Hegde
J. Appl. Physics

"Observation of Surface Defects in 6H-SiC Wafers"
A.O. Evvaraye, S.R. Smith, M. Skowronski and W.C. Mitchel
J. Appl. Phys.

8.4 Presentations

"DLTS and Admittance Spectroscopy of Si_{1-x}Ge_x/Si Grown by Gas Source Molecular Beam Epitaxy"
S. H. Li, P. K. Bhattacharya, S. R. Smith and W. C. Mitchel
Twelfth North American Conf. on MBE, Toronto, Canada, 12-14 October 92

"Semiconductor Surface Atom Energetics by Quantum Chemistry"
S. G. Das
MLP Symposium on Computational Material Science, July 16, 1992

"Semi-empirical Self-consistent calculations of GaAs [111]B Surface Reconstructions"
S. G. Das, D. L. Dorsey
Ohio Section of the American Physical Society, Ohio, October 11, 1991

"Application of Cellular Automata and Process Discovery to Vapor Phase Epitaxy"

D. L. Dorsey

Workshop on Computational Material Science via Digital Physics, Wright-Patterson AFB, Ohio, 22-23 April, 1992

"Application of Computational Chemistry Techniques to Modeling of Semiconductor Thin-Film Epitaxy"

D. L. Dorsey

Symposium on Computational Materials Science for Hardened Materials Research, Wright-Patterson AFB, Ohio, 15-16 July, 1992

"Semi-empirical Self-consistent calculations of the (2X2) and $\sqrt{19} \times \sqrt{19}$ Surface Reconstruction of GaAs [111]B"

S. G. Das, D. L. Dorsey

Gordon Conference on Computational Chemistry, New Hampton, NH, June 29, 1992

"Semi-empirical Self-consistent calculations of GaAs [111]B Surface Reconstructions"

S.G. Das, D.L. Dorsey

Intl. Conf. on Emerging Optoelectronic Technologies, India, December 12-18, 1991

"Calculation and Measurement of the Electron Density and Temperature Dependence of the Intersubband Absorption in n-type GaAs/Al_{0.3}Ga_{0.7}As Quantum Well"

F. Szmulowicz, T. Vaughan, M.O. Manasreh and C.E. Stutz

21st International Conference on the Physics of Semiconductors, Beijing, China August, 1992.

"Theoretical Modeling of the Intersubband Transition in an GaAs/Al_{0.3}Ga_{0.7}As Multiple Quantum Well Structure"

T. Vaughan, F. Szmulowicz, M.O. Manasreh, K.R. Evans and C. E. Stutz
Ohio Section of the American Physical Society, Ohio, October 11, 1991

"Calculation and Measurement of the Electron Density and Temperature Dependence of the Intersubband Absorption in n-type GaAs/Al_{0.3}Ga_{0.7}As Multiple Quantum Wells"

F. Szmulowicz, T. Vaughan, M.O. Manasreh and C.E. Stutz

Bull. Am. Phys. Soc. 36, 2742 (1991)

"Shubnikov-de Haas studies of negative persistent photoconductivity in AlGaSb/InAs quantum wells"
Ikai Lo, W. C. Mitchel, M. O. Manasreh, C. E. Stutz and K. R. Evans

Symposium on Advanced III-V Compound Semiconductor, Growth, Processing and Devices, 1991 MRS Fall Meeting, Boston, MA, Mat. Res. Soc. Abst., 198 (1991)

"Electron effective mass in Al_xGa_{1-x}Sb/InAs single quantum wells"

M.O. Manasreh, C.E. Stutz, K.R. Evans, G. Gumbs, Ikai Lo and W.C. Mitchel
APS March Meeting, Bull. Am.Phys. Soc. 37, 234 (1992)

"Study of a two dimensional electron gas by a new approach in modulation spectroscopy"

Ali Badakhshan, M. Sydor, and W.C. Mitchel

AVS Meeting, Seattle, November 1991

"Effect of Al composition on the deep level donors of Al_xGa_{1-x}Sb/InAs single quantum wells"

Ikai Lo, W.C. Mitchel, M.O. Manasreh, C.E. Stutz and K.R. Evans

Symposium on defect engineering in semiconductor growth, processing and device technology, 1992 MRS Spring Meeting, San Francisco, CA, Mat. Res. Soc. Abst. p 131 (1992)

"Effect of Al composition on the negative persistent photoconductivity in $\text{Al}_x\text{Ga}_{1-x}\text{Sb}/\text{InAs}$ single quantum wells"

Ikai Lo, W.C. Mitchel, M.O. Manasreh, C.E. Stutz and K.R. Evans

APS March Meeting, Bull. Am.Phys. Soc. 37, 358 (1992)

"Effective Mass of the 2-Dimensional Electron Gas in $\text{Al}_x\text{Ga}_{1-x}\text{Sb}/\text{InAs}$ Single Quantum Wells"

M.O. Manasreh, C.E. Stutz, K. R. Evans, G. Gumbs, I. Lo and W.C. Mitchel

Bull. APS 37 (1992)

"A Shubnikov-de Haas study in the strained AlGaSb/InAs/AlGaSb quantum wells"

I. Lo, W.C. Mitchel, M.O. Manasreh, C.E. Stutz and K.R. Evans

SOTAPOCS XV, Electronics, Dielectric Science and Technology Divisions, The Electrochemical Society Inc. October 13-18, 1991

"Intersubband Infrared Absorption in a GaAs/ $\text{Al}_{0.3}\text{Ga}_{0.7}\text{As}$ Multiple Quantum Well"

T. Vaughan, F. Szmulowicz, M.O. Manasreh, K.R. Evans, C.E. Stutz and D.W. Fischer

APS Meeting, Indianapolis, IN, March 16-20, 1992

"Low Temperature Photoluminescence and Absorption Investigation of Nonlinear Optical Material ZnGeP_2 "

S.M. Hegde, M.C. Ohmer, W.C. Mitchel, D.W. Fischer and P.G. Schuneman

APS March Meeting Bulletin 37, 304-305, Indianapolis, IN, March 16-20, 1992

"Properties of ZnGeP_2 and Possible Device Applications"

M.C. Ohmer

University of Pittsburgh, Dept. of Electrical Engineering Colloquium, May 27, 1992

"Photoluminescence studies of ZnGeP_2 "

S.M. Hegde

Workshop on ZnGeP_2 and related Semiconductor Materials, Cincinnati, Ohio, June 16-17, 1992

"Near Infrared Absorption in ZnGeP_2 "

P.G. Schuneman, T.M. Pollack, M.C. Ohmer, P.J. Drevinsky

Tenth International Conference on Crystal Growth ICCG-10, 16 August, 1992

"Low Temperature Photoluminescence and Absorption Investigation of Nonlinear Optical Material ZnGeP_2 "

M. C. Ohmer

Workshop on ZnGeP_2 and Related Semiconductor Materials, University of Cincinnati, June 16-17, 1992

"Electron Beam Processing of ZnGeP_2 "

N. Fernilius

Workshop on ZnGeP_2 and Related Semiconductor Materials, University of Cincinnati, June 16-17, 1992

"Laser Calorimetry"

J. Detrio

Workshop on ZnGeP_2 and Related Semiconductor Materials, University of Cincinnati, June 16-17, 1992

"Zinc Germanium Phosphide Development"

M. C. Ohmer and F. K. Hopkins

TTCP workshop on nonlinear optics, Malvern, UK, 21 May 1992

"IR Absorption in Proton- and Deuteron-Implanted Semi-Insulating InP:Fe"

D.W. Fischer, M.O. Manasreh and G. Matous

7th Conference on Semi-insulating III-V Materials, Ixtapa, Mexico 21-24, April 1992

"Nonlinear materials in the U. S. Air Force Wright Laboratory"

F. K. Hopkins

TTCP workshop on nonlinear optics, Malvern, UK, 21 May 1992

"Refractive indices and Dielectric Properties of Deuterated Zinc Tris Thiourea Sulfate"

David E. Zelmon, Uma B. Ramabadran and F. Kenneth Hopkins

Optical Soc. of America Nonlinear Optics: Materials, Fundamentals and Applications, Maui, Hawaii, Aug. 17, 1992

"Perturbation Theory for Nonlinear Wave Equations in a χ_2 Medium"

N. Amarsinghe, D.S. Moroi and David E. Zelmon

ALCOM Conference, Cuyahoga Falls, Ohio, May 28, 1992

"Processing and Optical Analysis of Polymeric Films"

S.J. Bai, G.A. Balchin, C.Y-C Lee, R. Mehta, J. Promislow, U. Ramabadran, R.J. Spry, T. Vaughan and

David E. Zelmon

Air Force Nonlinear Optical Polymers Conference, Wright-Patterson AFB, Ohio, December 8-10, 1991

"Corrections to the slowly varying amplitude approximation in a χ_2 optical medium"

N. Amarsinghe, D.S. Moroi and David E. Zelmon

Ohio Section of the American Physical Society, Ohio, October 11, 1991

"Rain Impact Testing of Durable Coatings on Water Clear ZnS"

John A. Detrio

SPIE International Symposium on Optical Applied Science and Engineering, Window and Dome Technologies and Materials III, San Diego, CA, July 1992

6.0 FY93 PATENTS, SCIENTIFIC PUBLICATIONS, & PRESENTATIONS

6.1 Patents

"Transparent Semiconductor Crystals"

M.C. Ohmer

Number 07/920,699, AF Invention 20180, Granted 1993

"Optical Modulation and Switching with Enhanced Third-Order Nonlinearity Multiple Quantum Well Effects"

F.K. Hopkins, J.T. Boyd, and H.E. Jackson

Number 07/878,272, Granted 1993

"High Contrast Switchable Target Discriminator"

F. Kenneth Hopkins

Number 5,118,191; June 2, 1992

"Fluorescent Object Recognition System Having Self-modulated Light Source"

F. Kenneth Hopkins

Number 4,642,526; February 10, 1987

"Electrically Controlled Liquid-Crystal Heat Valve"

Rand R. Biggers, J.W. Rish III, G.L. Henderson, C.N. Pham, and R.R. Fuller

Number 5,222,548; June 29, 1993

"Liquid-Crystal Heat Valve Controlled with Multiple Electrode Pairs"

M.E. Stefanov, Rand R. Biggers, J.W. Rish III, G.L. Henderson, and C.N. Pham

Number 5,188,171; February 23, 1993

6.2 Publications

Magnetic-Field-Induced Free Electron and Hole Recombination in Semimetallic $\text{Al}_x\text{Ga}_{1-x}\text{Sb}/\text{InAs}$ Quantum Wells"

Ikai Lo, W.C. Mitchel, and J.-P. Cheng

Phys. Rev. B 48, 9118 (1993)

"The Wannier-Stark Quantization by Internal Field in the HgTe/CdTe Superlattice"

Ikai Lo, W.C. Mitchel, K.A. Harris, R.W. Yanka, LmM. Mohnkern, A.R. Reisinger, and T.H. Myers

Appl. Phys. Lett. 62, 1533 (1993)

"MBE Growth Surface Roughening Kinetics of Ge (001) - A Theoretical Study"

R. Venkatasubramanian and D. L. Dorsey

J. Vacuum Sci. & Technol. B 11, 253 (1993)

"Infrared Absorption in Proton- and Deuteron-Implanted Semi-Insulating InP:Fe"

D.W. Fischer, M.O. Manasreh, G. Matous, and S.J. Pearton

Semi-insulating III-V Materials, Ixtapa, Mexico 1992, ed. C.J. Miner, W. Ford, and E.R. Wever, Institute of Physics Publ., Philadelphia, p. 259 (1993)

"Enhanced and Persistent Photocurrents in Bulk Semi-insulating GaAs at Low Temperatures"

W.C. Mitchel, Laura S. Rea, and Juan Jiménez

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"A Fully Automated Stage for Loss Measurements of Optical Waveguides"

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"Deep Levels in Undoped $\text{Si}_{1-x}\text{Ge}_x$ Grown by Gas-Source Molecular Beam Epitaxy"

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"A Shubnikov-de Haas Study in the Strained $\text{Al}_{0.6}\text{Ga}_{0.4}\text{Sb}/\text{InAs}/\text{Al}_{0.6}\text{Ga}_{0.4}\text{Sb}$ Quantum Wells"

Ikai Lo, W.C. Mitchel, M.O. Manasreh, C.E. Stutz, and K.R. Evans

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FY94 Amendment, WUD#48 "Electronic & Optical Materials"

"Calculation and Measurement of the Electron Density and Temperature Dependence of the Intersubband Absorption in n-type GaAs/Al_{0.3}Ga_{0.7}As Quantum Well"

F. Szmulowicz, T. Vaughan, M. O. Manasreh and C. E. Stutz

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'Thin upper-confining layer Al_xGa_{1-x}As-GaAs quantum well heterostructure"

S.J. Caracci, F.A. Kish, M.R. Krames, M.J. Ries, and N. Holonyak, Jr.

Appl. Phys. Lett. 62, 1006 (1993)

"Planer single-facet teardrop-shaped Al_xGa_{1-x}As-GaAs quantum well heterostructure laser"

S.J. Caracci, M.R. Krames, M.J. Ries, and N. Holonyak, Jr.

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6.3 Accepted for Publication

"Hydrogen-iron Interaction in Proton-implanted InP:Fe"

D.W. Fischer, M.O. Manasreh, and G. Matous

Appl. Phys. Lett.

"Calculation of Giant Third-order Nonlinear Susceptibilities due to Excitonic Processes in Rectangular GaAs Quantum Well Wires"

F.L. Madarasz, Frank Szmulowicz, F.K. Hopkins, and D.L. Dorsey

J. Appl. Phys.

"Native-Oxide-Defined Low-Loss AlGaAs-GaAs Planar Waveguide Bends"

S.J. Caracci, M.R. Krames, N. Holonyak, Jr., C.M. Herzinger, A.C. Crook, T.Z. DeTemple, and P.-A. Besse

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"Determination of the Valence Band Discontinuity in Be-doped GaAs/Al_{0.3}Ga_{0.7}As Multiple Quantum Wells using Admittance Spectroscopy"

S.R. Smith, F. Szmulowicz, and G.J. Brown

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"The negative persistent photconductivity in the deep quantum wells"

Ikai Lo, W.C. Mitchel, C.E. Stutz and M.Y. Yen

Proc. MRS Symposium on semiconductor heterostructures for photonic and electronic applications (1993)

"Observation of Surface Defects in 6H-SiC Wafers"

A.O. Evvaraye, S.R. Smith, M. Skowronski and W.C. Mitchel

J. Appl. Phys.

"Heat Transport Through MBBA due to Induced Electrohydrodynamic Motion"

R.R. Biggers, J. Rish III, and R. Fuller

J. Mol. Crys.-Liq. Crys.

FY94 Amendment, WUD#48 "Electronic & Optical Materials"

"Raman Investigation of the Nonlinear Optical Phenomenon of Polarization Rotation in Ti:LiNbO₃ Channel Waveguides"
U. B. Ramabadran, H. E. Jackson, and J. T. Boyd
J. Appl. Phys.

"Low-temperature PL Characterization of LPEE Grown GaSb and GaInAsSb Layers on GaSb"
S. Iyer, S. Hegde, K. K. Bajaj, A. Abul-Fadl, and W. Mitchel
MRS Symposium Proceedings, Spring Meeting, San Francisco, April 1993 (in press)

"Growth of InGaP₂ by LP-MOCVD and Characterization of Lattice Ordering"
V. E. Stenger, P. B. Kosek, S. M. Hegde, and M. C. Ohmer
Proceedings of the State of the Art Program on Compound Semiconductors (SOTAPoCS XVIII) held at the 183rd Meeting of the Electrochemical Society, Honolulu, Hawaii, May 1993.

6.4 Submitted for Publication

"An Improved Method for Measuring Relative Permittivity versus Temperature and Frequency of Dielectric Materials"
E. T. Kensky and A.L. McPherson
Rev. Sci. Instru.

"Electron Paramagnetic Resonance Study of a Point Defect in as-Grown ZnGeP₂"
M.H. Rakowsky, W.K. Kuhn, W.J. Lauderdale, L.E. Halliburton, G.J. Edwards, M.P. Scripsick, P.G. Schunemann, T.M. Pollack, M.C. Ohmer, and F.K. Hopkins
J. Appl. Phys.

"Shallow Levels in n-type 6H-Silicon Carbide as Determined by Admittance Spectroscopy"
A.O. Evwaraye, S.R. Smith, and W.C. Mitchel
J. Appl. Phys.

"Electrical Properties of Deep Levels in Bulk n-type Silicon Carbide"
A.O. Evwaraye, S.R. Smith, and W.C. Mitchel
J. Appl. Phys.

"Deposition of SiC from a Laser-Ablated 6H-SiC Target at Room Temperature"
M.A. Capano, P.T. Murray, D. Dempsey, and J.T. Grant
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"Atomic Force Microscopy of AlN Thin Films Grown on Al₂O₃"
A.J. Steckl, M.D. Roth, J. Edgar, and Z.J. Yu
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"Observation of the Persistent Photo-effect in GaAs/AlGaAs Multiple Quantum Wells"
D. Donnelly, J. Schauer, M.O. Manasreh, C.E. Stutz, and F. Szmulowicz
Proc. 17th Internat. Conf. on Defects in Semiconductors (ICDS-17), Gmunden, Austria, Jul 93

"High Volume Restrictions on Thermodynamic Equations of State"
Robert Nelson and J. Seal
Am. Instit. of Chem. Engineers

"Optical Clarity and Waveguide Performance of Thin Film Perovskites on MgO"
F.J. Walker, R.A. McKee, Huan-wun Yen, and D.E. Zelmon
Appl. Phys. Lett.

"Ion Implantation Damage and Annealing in GaSb"
S. Iyer, R. Parakkat, B. Patnaik, N. Parikh, and S. Hegde
MRS Symposium Proceedings, Fall 1993 meeting

"Optical Properties of Deuterated Zinc Tris Thiourea Sulphate"
U.B. Ramabadran, A.L. McPherson, and D.E. Zelmon
J. Appl. Phys.

"Additional H-related Local Vibrational Modes in Proton-implanted InP"
D.W. Fischer, M.O. Manasreh, and G. Matous
J. Appl. Phys.

"Photocurrent Transients in Semi-Insulating GaAs, Effects of EL2 and other Defects"
W.C. Mitchel and J. Jiménez
J. Appl. Phys.

"Prediction of Giant $\chi^{(3)}$ Values from a Calculation of Excitonic Nonlinear Optical Properties in Rectangular GaAs Quantum Well Wires"
F.L. Madarasz, Frank Szmulowicz, F.K. Hopkins, and D.L. Dorsey
Phys. Rev. B

6.5 Presentations

(Invited) "Development of GaInP/GaAs Quantum Wells for Infrared Detector Applications"
G.J. Brown
Workshop on Future Trends of Quantum Structures and Device Applications, Evanston, IL, June 1993

(Invited) "Optical Quantum Well Modeling"
F. Szmulowicz
Quantum Device Engineering Workshop, Cincinnati, OH, 13-15 Sep 1993

"DLTS and Admittance Spectroscopy of $Si_{1-x}Ge_x/Si$ Grown by Gas Source Molecular Beam Epitaxy"
S. H. Li, P. K. Bhattacharya, S. R. Smith and W. C. Mitchel
Twelfth North American Conf. on MBE, Toronto, Canada, 12-14 October 92

"Role of Liquid in Improving the Superconductive Properties of the Ag/Bi(Pb)-Sr-Ca-Cu-O System"
Asok K. Sarkar, I. Maartense, and T. L. Peterson
MRS Fall Meeting, Boston MA, November 1992

"A Theoretical Study of Amorphous-Crystalline Transition in Si [111] MBE Growth"
R. Venkatasubramanian, D. L. Dorsey, and S.G. Das
MRS Fall Meeting, Boston, MA, November 1992

"The negative persistent phototconductivity in the deep quantum wells"
Ikai Lo, W.C. Mitchel, C.E. Stutz and M.Y. Yen
Symposium on semiconductor heterostructures for photonic and electronic applications, MRS Fall Meeting, Boston, MA, November 1992

"Multiple Magnetic Transitions Near T_c in YBCO (123+211) Crystals Prepared by Melt-Texturing"
I. Maartenese, G. Kozlowski, and T.L. Peterson
MRS Fall Mtg., Boston, MA, November, 1992

"The Wannier-Stark Quantization by Internal Field in the HgTe/CdTe Superlattice"
Ikai Lo, W.C. Mitchel, T.H. Myers, and K.A. Harris
Am. Phys. Soc. March Mtg., Seattle, WA, March 1993.

"Luminescence Spectroscopy of Zinc Germanium Phosphide"
M.R. Gregg, P.H. Ostliek, R.L. Hengehold, Y.K. Yeo, M.C. Ohmer, S.M. Hegde, and P.G. Shunemann
Bull. APS 38, 686, abs.O19-1 (1993)

"Growth and Photoluminescence of GaSb and $As_{1-x}In_xAs_ySb_{1-y}$ Grown on GaSb Substrates by Liquid-Phase Electroepoxy"
S. Iyer, A.A. Gadl, S. Hegde, K.K. Bajaj, and W.C. Mitchel
Bull. APS 38, 686, abs.O19-2 (1993)

FY94 Amendment, WUD#48 "Electronic & Optical Materials"

"A Shubnikov-de Haas Study of Tilted Magnetic Field in the HgTe/CdTe Superlattice"
Ikai Lo, W.C. Mitchel, and D. Boeringer
Spring MRS Mtg., San Francisco, CA, April 1993.

"Growth and Characterization of 3-methoxy 4-hydroxy benzaldehyde"
Uma B. Ramabadran and David E. Zelmon
MRS Spring Meeting, San Francisco, CA, April 1993.

"Interferometric measurement of the piezoelectric coefficients of triallyl thiourea cadmium chloride crystals"
Uma B. Ramabadran, David E. Zelmon and Gretchen C. Kennedy
MRS Spring Meeting, San Francisco, CA, April 1993.

"Surface Ordering Kinetics of MBE Grown $Ge_0.5Al_0.5As$ - A Theoretical Study"
R. Trivedi, R. Venkatasubramanian, D.L. Dorsey, and S. Krishnamurthy
Spring MRS Mtg., San Francisco, CA, April 1993.

"Intersubband Transitions in $In_0.07Ga_0.93As/Al_0.4Ga_0.6As$ Multiple Quantum Wells"
F. Szmulowicz, M. O. Manasreh, C. Kutsche, and C. E. Stutz
Materials Research Society Spring Mtg., San Francisco, April 1993.

"Low-temperature PL Characterization of LPEE Grown GaSb and GaInAsSb Layers on GaSb"
S. Iyer, S. Hegde, K. K. Bajaj, A. Abul-Fadl, and W. Mitchel
MRS Spring Meeting, San Francisco, April 1993.

"Growth of InGaP₂ by LP-MOCVD and Characterization of Lattice Ordering"
V. E. Stenger, P. B. Kosel, S. M. Hegde, and M. C. Ohmer
State of the Art Program on Compound Semiconductors (SOTAPoCS XVIII) held at the 183rd Meeting of the Electrochemical Society, Honolulu, Hawaii, May 1993.

"Nonlinear Optical Materials: The Air Force Laboratory Programs"
F.K. Hopkins and M.N. Alexander
AGED STAR on Nonlinear Optical Materials, Washington DC, 21-22 July 1993

"Observation of the Persistent Photo-effect in GaAs/AlGaAs Multiple Quantum Wells"
D. Donnelly, J. Schauer, M.O. Manasreh, C.E. Stutz, and F. Szmulowicz
17th International Conf. on Defects in Semiconductors (ICDS-17), Gmunden, Austria, 18-23 Jul 93

"Magnetic Resonance of ZnGeP₂: Defect Centers in an Optical Parametric Oscillator"
M.K. Rakowsky, W.K. Kuhn, R.A. Mantz, P.J. Drevinsky, M.C. Ohmer, D.F. Bliss, P.G. Schunemann, and T.M. Pollack
35th Rocky Mountain Conf. on Analytical Chemistry, Denver, CO, 25-29 Jul 1993

"The Role of Platinum in Melt-Processed $YBa_2Cu_3O_{7-x}$ Superconductor with $Y_2BaCu_3O_5$ Inclusions"
G. Kozlowski, C.E. Oberly, I. Maartense, and W Endres
Int Cryogenic Materials Conference, Albuquerque NM, July 1993

6.6 Submitted/Accepted for Presentation in FY94

"Phase Matching Characterization and Crystal Growth of 4-hydroxy, 3-methoxy benzaldehyde"
Uma B. Ramabadran, Rama Vuppuladhadium and David E. Zelmon
Optical Society of America Meeting, Toronto, 3-9 October 1993

"Photoresponse Study of Normal Incidence Detection in p-type GaAs/AlGaAs Multiple Quantum Wells"
G.J. Brown and F. Szmulowicz
The 1993 U.S. Workshop on the Physics and Chemistry of HgCdTe and other IR Materials, Seattle, WA, 19-21 Oct 1993

"Impurity-related Absorption Bands in Bulk Silicon Carbide Crystals"
M. Shah, W.C. Mitchel, and J. Solomon
International Conf. on SiC and Related Materials-1993, Washington, DC, 1-3 Nov 93

"Deposition of SiC from a Laser-Ablated 6H-SiC Target at Room Temperature"

M.A. Capano, P.T. Murray, D. Dempsey, and J.T. Grant
International Conf. on SiC and Related Materials-1993, Washington, DC, 1-3 Nov 93

"Atomic Force Microscopy of AlN Thin Films Grown on Al_2O_3 "

A.J. Steckl, M.D. Roth, J. Edgar, and Z.J. Yu
International Conf. on SiC and Related Materials-1993, Washington, DC, 1-3 Nov 93

"Characterization of Defects in n-type 6H-SiC Single Crystals by Optical Admittance Spectroscopy"

A.O. Evwaraye, S.R. Smith, and W.C. Mitchel
Fall MRS Mtg., Boston, MA, November 1993.

"Temperature and Polarization Dependence of the Optical Absorption in ZnGeP_2 at Two Microns"

M. Shah, D.W. Fischer, M.C. Ohmer, M.O. Manasreh, P.G. Schunemann, and T.M. Pollack
Fall MRS Mtg., Boston, MA, November 1993.

"Optical Absorption of Transition Metal Impurities in 6H-SiC Single Crystals"

J. Jenny, M. Skowronski, M. Shah, and J. Solomon
Fall MRS Mtg., Boston, MA, November 1993.

"Anomalous Behavior of DX Centers in Compositionally Graded $\text{GaAs}/\text{Al}_x\text{Ga}_{1-x}\text{As:Si}$ Heterojunctions"

S.R. Smith and A.O. Evwaraye
Fall MRS Mtg., Boston, MA, November 1993.

"Stability of Sulfide Passivated Gallium Arsenide Surfaces"

J.S. Solomon, L. Petry, and S.R. Smith
Fall MRS Mtg., Boston, MA, November 1993.

"A Sapphire Resonator Technique for Measuring the Complex Surface Impedance versus Temperature of HTS Thin Films"

R. R. Fletcher, J.A. Cook, and R.R. Biggers
Fall MRS Mtg., Boston, MA, November 1993.

"A Study of Magnetic-Field-Induced Semimetal to Semiconductor Transition in $\text{Al}_x\text{Ga}_{1-x}\text{Sb}/\text{InAs}$ Quantum Well"

Ikai Lo, W.C. Mitchel, and J.-P. Cheng
Fall MRS Mtg., Boston, MA, November 1993.

(Invited) "Deep Level Defects, Luminescence, and the Electro-Optic Properties of SiGe/Se Heterostructures"

Pallab Bhattacharya, Shin Hwa Li, and Steve Smith
Fall MRS Mtg., Boston, MA, November 1993.

"Striking Differences in the Properties of $\text{YBa}_2\text{Cu}_3\text{O}_7$ Thin Films, Grown Side-by-side by PLD at Power Densities of $\sim 10^9 \text{ W/cm}^2$ "

R.R. Biggers, I. Maartense, T.L. Peterson, R. Fletcher, D. Dempsey and M.G. Norton
Spring MRS Mtg., Symposium S: High-Temperature Superconductors-Multilayers, Interfaces, and Applications, San Francisco, CA, April 1994

"Examination of Particles and Outgrowths on the Surface of Epitaxial $\text{YBa}_2\text{Cu}_3\text{O}_7$ Thin Films"

M.G. Norton, R.R. Biggers, I. Maartense and J.L. Brown
Spring MRS Mtg., Symposium F: Epitaxial Oxide Thin Films and Heterostructures, San Francisco, CA, April 1994

6.0 FY94 PATENTS, SCIENTIFIC PUBLICATIONS, & PRESENTATIONS

6.1 Patents

"Laminated Upper Cladding Structure For A Light Emitting Device"
Mike Ludowise, Nick Holonyak Jr., Steve Caracci, Michael Krames, Fred Kish
Number 08/193,681

"Semiconductor Devices and Techniques For Controlled Optical Confinement"
Nick Holonyak Jr., Fred Kish, Steve Caracci
Number 5,327,448, Issued July 5, 1994

"Multi-System Laser Safety Shutter Controller"
E. Thomas Kensky (AF Invention 19915)
Number 5,301,347, Issued 5 Apr 94

"Optical Modulation and Switching with Enhanced Third-Order Nonlinearity Multiple Quantum Well Effects" (AF Invention 19654)
F.K. Hopkins, J.T. Boyd, and H.E. Jackson
Number 5,274,246, Issued 28 Dec 1993

"Transparent Semiconductor Crystals"
M.C. Ohmer (AF Invention 20180)
Number 5,259,917, Issued 9 Nov 93

6.2 FY94 PUBLICATIONS

6.2.1 Published Book:

Technologies For Optical Fiber Communications, Ed. by Gail J. Brown, Didier J. Decoster, Joanne S. LaCourse, Yoon S. Park, Kenneth D. Pedrotti, Susan R. Sloan
SPIE Proceedings 2149 (1994)

6.2.2 Published in Refereed Journals:

"Interface roughness scattering in thin, undoped GaInP/GaAs quantum wells,"
W. C. Mitchel, G. J. Brown, I. Lo, S. Elhamri, M. Ahoujja, K. Ravindran, R. S. Newrock, M. Razeghi, and X. He
Appl. Phys. Lett. 65, 1578 (1994)

"Electronic properties of $Al_xGa_{1-x}Sb/InAs$ quantum wells"
I. Lo, W. C. Mitchel, and J.-P. Cheng
Phys. Rev. B 50, 5316 (1994)

"Intersubband hole absorption in GaAs-GaInP quantum wells grown by gas source molecular beam epitaxy"
G. J. Brown, S. M. Hegde, J. Hoff, C. Jelen, S. Slivken, E. Michel, O. Duchemin, E. Bigan, and M. Razeghi
Appl. Phys. Lett. 65, 1130 (1994).

"Observation of a negative persistent photoconductivity effect in InGaSb/InAs quantum wells,"
I. Lo, W. C. Mitchel, R. Kaspi, S. Elhamri, and R. S. Newrock
Appl. Phys. Lett. 65, 1024 (1994)

"Negative Persistent Photoeffect on Cyclotron Resonance in InAs/AlGaSb Quantum Wells," J.-P. Cheng, I. Lo, and W. C. Mitchel
J. Appl. Phys. **76**, 667 (1994).

"Long wavelength native-oxide-defined InAlAs-InP-InGaAsP quantum well heterostructure laser diodes"
S. J. Caracci, M. R. Krames, N. Holonyak Jr., M. J. Ludowise and A. Fischer-Colbrie
J. Appl. Phys. **75**, 2706 (1994)

"Polarized luminescence study of ordered nonlinear optical material ZnGeP₂"
J. E. McCrae, Jr., M. R. Gregg, R. L. Hengehold, Y. K. Yeo, and P. H. Ostliek, M. C. Ohmer, P. G. Schunemann and T. M. Pollak
Appl. Phys. Lett. **64**, 3142 (1994).

"Optical Clarity and Waveguide Performance of Thin Film Perovskites on MgO"
F.J. Walker, R.A. McKee, Huan-wun Yen, and D.E. Zelmon
Appl. Phys. Lett. **65**, 1495 (1994)

"Optical Properties of deuterated Zinc Tris Thiourea Sulphate"
Ramabadran, Uma B., Angela L. McPherson, and David E. Zelmon,
J. Appl. Phys. **76**, 1150 (1994)

"Microwave properties of YBa₂Cu₃O_{7-x} films at 35 GHz from magnetotransmission and magnetoreflection measurements"
E. K. Moser, W. J. Tomasch, M. J. McClorey, J. K. Furdyna, M. W. Coffey, C. L. Pettiette-Hall and S. M. Schwarzbek,
Physical Review B **49**, 4199 (1994)

"Photocurrent Transients in Semi-Insulating GaAs, Effects of EL2 and other Defects"
W.C. Mitchel and J. Jiménez
J. Appl. Phys. **75**, 3060 (1994)

"Electron Paramagnetic Resonance Study of a Native Acceptor in as-Grown ZnGeP₂"
M.H. Rakowsky, W.K. Kuhn, W.J. Lauderdale, L.E. Halliburton, G.J. Edwards, M.P. Scripsick, P.G. Schunemann, T.M. Pollack, M.C. Ohmer, and F.K. Hopkins
Appl. Phys. Lett. **64**, 1615 (1994)

"Shallow Levels in n-type 6H-Silicon Carbide as Determined by Admittance Spectroscopy"
A.O. Evvaraye, S.R. Smith, and W.C. Mitchel
J. Appl. Phys. **75**, 3472 (1994)

"Additional H-related Local Vibrational Modes in Proton-implanted InP"
D.W. Fischer, M.O. Manasreh, and G. Matous
Semicond. Sci. Technol. **9**, 1 (1994)

"Calculation of Giant Third-order Nonlinear Susceptibilities due to Excitonic Processes in Rectangular GaAs Quantum Well Wires"
F.L. Madarasz, Frank Szmulowicz, F.K. Hopkins, and D.L. Dorsey
J. Appl. Phys. **75**, 639 (1994)

"Observation of Surface Defects in 6H-SiC Wafers"
A.O. Evvaraye, S.R. Smith, M. Skowronski and W.C. Mitchel
J. Appl. Phys. **74**, 5269 (1993)

"Native-Oxide-Defined Low-Loss AlGaAs-GaAs Planar Waveguide Bends"
S.J. Caracci, M.R. Krames, N. Holonyak, Jr., C.M. Herzinger, A.C. Crook, T.Z. DeTemple, and P.-A. Besse
Appl. Phys. Lett. **63**, 2265 (1993)

"Heat Transport Through MBBA due to Induced Electrohydrodynamic Motion"
R.R. Biggers, J. Rish III, and R. Fuller
J. Mol. Crys. Liq. Crys. **237**, 351 (1994)

"Hydrogen-iron Interaction in Proton-implanted InP:Fe"
D.W. Fischer, M.O. Manasreh, and G. Matous
Appl. Phys. Lett. **63**, 3038 (1993)

"Determination of the Valence Band Discontinuity in Be-doped GaAs/Al_{0.3}Ga_{0.7}As Multiple Quantum Wells using Admittance Spectroscopy"
S.R. Smith, F. Szmulowicz, and G.J. Brown
J. Appl. Phys. **72**, 1010 (1994)

"Prediction of Giant $\chi^{(3)}$ Values from a Calculation of Excitonic Nonlinear Optical Properties in Rectangular GaAs Quantum Well Wires"
F.L. Madarasz, Frank Szmulowicz, F.K. Hopkins, and D.L. Dorsey
Phys. Rev. B **49**, 13528 (1994)

"Raman Investigation of the Nonlinear Optical Phenomenon of Polarization Rotation in Ti:LiNbO₃ Channel Waveguides"
U. B. Ramabadran, H. E. Jackson, and J. T. Boyd
J. Appl. Phys. **74**, 1492 (1993)

"Measurement of Surface Impedance versus Temperature using a Generalized Sapphire Resonator Technique"
R. Fletcher and J. Cook
Rev. Sci. Instru. **65**, 2658 (1994)

"Growth of binary organic NLO crystals: m.Na-p.NA and m.Na-CNA systems"
T. Henningsen, N.B. Singh, R.H. Hopkins, R. Mazelsky, F.K. Hopkins, D.O. Frazier, and O.P. Singh
Materials Letters **20**, 203 (1994)

6.2.3 Published in Refereed Conference Proceedings:

"Deposition of SiC from a Laser-Ablated 6H-SiC Target at Room Temperature"
M.A. Capano, P.T. Murray, D. Dempsey, and J.T. Grant
Silicon Carbide and Related Materials, eds. M.G. Spencer, et al., Inst. of Phys. Conf. Series **137**, 91 (1994)

"Atomic Force Microscopy of AlN Thin Films Grown on Al₂O₃"
A.J. Steckl, M.D. Roth, J. Edgar, and Z.J. Yu
Silicon Carbide and Related Materials, eds. M.G. "Spencer, et al., Inst. of Phys. Conf. Series **137**, 555 (1994)

"Electron and Scanning Probe Microscopies in the Study of YBa₂Cu₃O₇ Thin Film Growth"
M. G. Norton, R.R. Biggers, I. Maartense, E.K. Moser, and J.L. Brown
Proc. 52nd Ann. Mtg. Microscopy Soc. of America (1994)

"Deep Level Defects, Luminescence, and the Electro-Optic Properties of SiGe/Si Heterostructures"
Pallab Bhattacharya, Shin-Hua Li, Jinju Lee, and Steve Smith
Invited Talk Fall Meeting of the Materials Res. Soc. 1993
Material Res. Soc. Symposium Proceedings **325**, 147 (1994)

"Characterization of Defects in n-type 6H-SiC Single Crystals by Optical Admittance Spectroscopy"
A.O. Evwaraye, S.R. Smith, and W.C. Mitchel
Mater. Res. Soc. Symposium Proc. **325**, 353 (1994)

"Stability of Sulfide Passivated Gallium Arsenide Surfaces"
J.S. Solomon, L. Petry, and S. R. Smith
Materials Res. Soc. Symposium Proceedings **318**, 237 (1994)

"MBE Doping Kinetics - A Rate Equation Study"
S. Bendi, R. Venkatasubramanian and D.L. Dorsey
Mechanisms of Thin Film Evolution, edited by S.M. Yalisove, C.V. Thompson and D.J. Eaglesham
MRS Symposium Series **317**, 387 (1994)

"A Monte Carlo Model of GaAs (111)B Epitaxy"
D.L. Dorsey, R. Venkatasubramanian, M.Y. Yen and T.W. Haas
Compound Semiconductor Epitaxy, edited by C.W. Tu, L.A. Kolodziejski and V.R. McCrary
MRS Symposium Series **340**, 41 (1994)

"Low-temperature PL Characterization of LPEE Grown GaSb and GaInAsSb Layers on GaSb"
S. Iyer, S. Hegde, K. K. Bajaj, A. Abul-Fadl, and W. Mitchel
Mater. Res. Soc. Symp. Proc. **299**, 41 (1994)

"Ion Implantation Damage and Annealing in GaSb"
S. Iyer, R. Parakkat, B. Patnaik, N. Parikh, and S. Hegde
Mater. Res. Soc. Symp. Proc. **316**, 185 (1994)

"Temperature and polarization dependence of the optical absorption in ZnGeP₂ at two micrometers"
M. Shah, M.C. Ohmer, D.W. Fischer, N.C. Fernelius, M.O. Manasreh, P.G. Schunemann, and T.M. Pollak
Defects in Advanced Semiconductors: Physics and Applications ed. M.O. Manasreh, H.J. von Bardeleben, G.S. Pomrenke, M. Lannoo, & D.H. Talwar
MRS Sympos. Proceedings 325, 463 (1994)

"Anomalous Behavior of DX Centers in Compositionally Graded GaAs/Al_xGa_{1-x}As:Si Heterojunctions"
S.R. Smith and A.O. Evwaraye
Mat. Res. Soc. Symp. Proc. 326, 193 (1994)

6.2.4 Non-Refereed Publications:

"Tech Transfer and the Federal Labs"
F. Kenneth Hopkins
Optics and Photonics News 4, 2 (1993)

"Tech Transfer"
F. K. Hopkins and P.M. Hemenger
Mini-Conductor 27, 4 (1994)

"Properties and Bibliography of GaSe"
Nils C. Fernelius
WL-TR-94-4013, February 1994

6.3 ACCEPTED FOR PUBLICATION

(Invited Review Article in upcoming book)

"Normal Incidence Detection of Infrared Radiation in P-type GaAs/AlGaAs Quantum Well Structures"
G. J. Brown and F. Szmulowicz
Semiconductor Quantum Wells and Superlattices for Long-Wavelength Infrared Detectors,
Gordon Breach, Vol. I in the new Electro-optical Properties Series.

"Temperature and Many Body Effects on the Intersubband Transition in a GaAs/Al_{0.3}Ga_{0.7}As Multiple Quantum Well"
F. Szmulowicz, M.O. Manasreh, C.E. Stutz, and T. Vaughan
Phys. Rev. B (15 October 94)

"Temperature Dependence of Photoluminescence Line Width in Modulation Doped Pseudomorphic High Electron Mobility Transistor Al_xGa_{1-x}As/In_yGa_{1-y}As/GaAs Structures"
P.W. Yu, B. Jogai, T.J. Rogers, P.A. Martin, and J.M. Ballingall
Appl. Phys. Lett. (December 1994)

"YBCO Film Growth on Ultra-Thin Ag Layers"
C. Zhong, S.T. Ruggiero, and R. Fletcher
J. of Matls. Res. 9 (November 1994)

"MBE Doping Kinetics - A Rate Equation Model"
S. Bendi, R. Venkatasubramanian and D.L. Dorsey
J. Appl. Phys.

"Examination of electrical and optical properties of vanadium in bulk n-type silicon carbide
A.O. Evwaraye, S. R. Smith and W. C. Mitchel
J. Appl. Phys. (15 Nov 94)

"Properties and Bibliography of GaSe"
Nils C. Fernelius
Progress in Crystal Growth and Characterization of Materials

"Surface Outgrowths on Laser-Deposited YBa₂Cu₃O₇ Thin Films"
M. Grant Norton, Rand R. Biggers, Iman Maartense, E. K. Moser, and Jeff L. Brown
Physica C

"Photoresponse Study of Normal Incidence Detection in P-Type GaAs/AlGaAs MQWs"
G.J. Brown, F. Szmulowicz, and S.M. Hegde
Proc. Mercury-Cadmium-Telluride Conf. (Oct 93)
Journal of Electr. Mat. (1994, in print).

"Semi-empirical SCF Study of Surface Atom Energetics in Semiconductors: Si and GaAs"
S.G. Das and D.L. Dorsey
Int. J. of Computational Methods

Growth of InGaP₂ by LP-MOCVD and Characterization of Lattice Ordering"
V. E. Stenger, P. B. Kosek, S. M. Hegde, and M. C. Ohmer
Proceedings of the State of the Art Program on Compound Semiconductors (SOTAPOCS XVIII) held at the 183rd Meeting of the Electrochemical Society, Honolulu, Hawaii, May 1993.

"Characterization of Deep Defects in n-type 6H-SiC Single Crystals by Optical Admittance Spectroscopy"
A.O. Evwaraye, S.R. Smith, and W.C. Mitchel
Mater. Res. Soc. Symp. Proc. (1994 Spring Mtg.)

Deep Levels in Undoped Bulk 6H-SiC and Associated Impurities: Application of Optical Admittance Spectroscopy.
W.C. Mitchel, Matthew Roth, S.R. Smith, A.O. Evwaraye, and J. Solomon
Proc. 21st Internat'l Conf. on Compound Semiconductors (Sept 94)

"Computational Methods for Modeling Semiconductor Thin-Film Epitaxy"
D.L. Dorsey
in Computational Materials Science for Laser Hardened Materials Research (Internal Tech Report)

"New Nonlinear Optical Crystals for Infrared Countermeasures"
F. Kenneth Hopkins & Nils C. Fernelius
Proceedings 1994 IRIS Materials Specialty Group Symposium (Aug 94)

"The negative persistent photconductivity in the deep quantum wells"
Ikai Lo, W.C. Mitchel, C.E. Stutz and M.Y. Yen
Proc. MRS Symp. semiconductor heterostructures for photonic and electronic applications (1993)

"Examination of Particles and Outgrowths on the Surface of Epitaxial YBa₂Cu₃O₇ Thin Films"
M.G. Norton, R.R. Biggers, I. Maartense and J.L. Brown
Symposium F: Epitaxial Oxide Thin Films and Heterostructures, Mat. Res. Soc. Symp. Proc., San Francisco, CA (Apr 1994)

6.4 SUBMITTED FOR PUBLICATION

"General expression for optical transition probabilities within the envelope-function approximation"
Frank Szmulowicz
Letters to JETP

"Calculation of Resonant Absorption and Phototresponse Measurement in p-type GaAs/AlGaAs Quantum Wells"
Frank Szmulowicz and Gail J. Brown
Appl. Phys. Lett.

"GaAs/GaInP p-type Quantum Well Intersubband Photodetectors"
J. Hoff, X. He, M. Erdtmann, S. Slivken, R. Williams, E. Bigan, M. Razeghi, and G.J. Brown
Appl. Phys. Lett.

"Second subband population in δ-doped AlInAs/GaInAs heterostructures"
I. Lo, W. C. Mitchel, M. Ahoujja, J.-P. Cheng, and A. Fathimulla,
J. Appl. Phys.

"Vanadium Related near-band-edge Absorption Bands in three SiC polytypes"
J.R. Jenny, M. Skowronski, W.C. Mitchel, and H.M. Hobgood
J. Appl. Phys.

"Persistent photocurrent in thin undoped GaInP/GaAs quantum wells,"
S. Elhamri, M. Ahoujja, K. Ravindran, R. S. Newrock, W. C. Mitchel, G. J. Brown, I. Lo, Manijeh Razeghi, and X. He,
Phys. Rev. B.

"The Physics of Normal Incidence Absorption in p-type GaAs/AsGaAs Quantum Well Infrared Detectors"
G.J. Brown and F. Szmulowicz
Proc. 2nd Intl. Symp. on Long-Wavelength Infrared Detectors: Physics and Applications, 186th Mtg. ElectroChem. Soc., Miami, FL (10-12 Oct 1994)

"*In Situ* Transmission Electron Microscopy Observations of Twinning
in Lanthanum Aluminate"

M. Grant Norton and Rand R. Biggers
Scripta Metallurgica et Materialia

"Defects and Anomalous Film Growth at the edge of single Crystal Substrates"

M. Grant Norton, Rand R. Biggers, and Iman Maartense
J. of Materials Science Letters

"Excitonic Nonlinear Optical Processes in GaAs Quantum Well Wires"

R.O. Klepfer, F.L. Madarasz, and F. Szmulowicz
Phys. Rev. B

"Approximate Methods of Solutions to Nonlinear Wave Equations in a $\chi^{(2)}$ Medium"

N.D. Amarasinghe, D.S. Moroi, D.E. Zelmon, and F.K. Hopkins
J. Opt. Soc. Am., Part B

"Derivation of a General Expression for the Momentum Matrix Elements within the Envelope-Function Approximation"

F. Szmulowicz
Phys. Rev. B

"Calculation and Measurement of the Bound-to-Continuum Absorption in a p-type GaAs/AlGaAs Quantum Well"

Frank Szmulowicz and Gail J. Brown
Phys. Rev. B

"Observation of the Persistent Photo-effect in GaAs/AlGaAs Multiple Quantum Wells"

D. Donnelly, J. Schauer, M.O. Manasreh, C.E. Stutz, and F. Szmulowicz
Proc. 17th Internat. Conf. on Defects in Semiconductors (ICDS-17), Gmunden, Austria (July 1993)

"Direct Measurement of ZnGeP₂ Birefringence from 0.66 to 12.2 μ m Using Polarized Light Interference"

D.W. Fischer, M.C. Ohmer, P.G. Schunemann, and T.M. Pollak
J. Appl. Phys.

"High Volume Restrictions on Thermodynamic Equations of State"

Robert Nelson and J. Seal
Am. Instit. of Chem. Engineers

"Microstructure and Properties of YBa₂Cu₃O₇ Thin Films Grown on Vicinal LaAlO₃ Substrates"

R.R. Biggers, M.G. Norton, I. Maartense, T.L. Peterson, E.K. Moser, D. Dempsey, M.A. Capano, J. Talvacchio, J.L. Brown, and J.D. Wolf
IEEE Trans. on Appl. Supercond.

"Self-Heating Hotspot Effects in HTS Thin Films"

T.L. Peterson, I. Maartense, and Rand R. Biggers
IEEE Trans. on Appl. Supercond.

"Transport Properties of YBCO Films on Ultra-Thin Ag Layers"

C. Zhong, S.T. Ruggiero, R. Fletcher, and E. Moser
IEEE Trans. on Appl. Supercond.

6.5 FY94 PRESENTATIONS

"Phase Matching Characterization and Crystal Growth of 4-hydroxy, 3-methoxy benzaldehyde"

Uma B. Ramabadran, Rama Vuppuladhadium and David E. Zelmon
Optical Society of America Meeting, Toronto (3-9 October 1993)

"Photoresponse Study of Normal Incidence Detection in p-type GaAs/AlGaAs Multiple Quantum Wells"

G.J. Brown and F. Szmulowicz
The 1993 U.S. Wkshp on the Phys. and Chem. of HgCdTe and other IR Materials, Seattle, WA (19-21 Oct 1993)

"Deposition of SiC from a Laser-Ablated 6H-SiC Target at Room Temperature"

M.A. Capano, P.T. Murray, D. Dempsey, and J.T. Grant
International Conf. on SiC and Related Materials-1993, Washington, DC (1-3 Nov 93)

"Atomic Force Microscopy of AlN Thin Films Grown on Al_2O_3 "

A.J. Steckl, M.D. Roth, J. Edgar, and Z.J. Yu

International Conf. on SiC and Related Materials-1993, Washington, DC (1-3 Nov 93)

(Invited)"Air Force Superconductivity Materials Program"

T.L. Peterson

Navy Consortium for Superconductivity. Newport RI (November 1993)

"Temperature and Polarization Dependence of the Optical Absorption in ZnGeP_2 at Two Microns"

M. Shah, D.W. Fischer, M.C. Ohmer, N.C. Fernelius, M.O. Manasreh, P.G. Schunemann, and T.M. Pollack
Fall MRS Mtg., Boston, MA (29Nov-3Dec 1993)

"MBE Doping Kinetics - A Rate Equation Study"

S. Bendi, R. Venkatasubramanian and D.L. Dorsey

Fall MRS meeting, Boston, MA (29Nov-3Dec 1993)

"Characterization of Defects in n-type 6H-SiC Single Crystals by Optical Admittance Spectroscopy,"

A. O. Evwaraye, S. R. Smith and W. C. Mitchel

MRS Fall Meeting, Boston, MA (29Nov-3Dec 1993)

"Anomalous Behavior of DX Centers in Compositionally Graded $\text{GaAs}/\text{Al}_x\text{Ga}_{1-x}\text{As:Si}$ Heterojunctions"

S.R. Smith and A.O. Evwaraye

Fall MRS Mtg., Boston, MA (29Nov-3Dec 1993)

"Stability of Sulfide Passivated Gallium Arsenide Surfaces"

J.S. Solomon, L. Petry, and S.R. Smith

Fall MRS Mtg., Boston, MA (29Nov-3Dec 1993)

"A Sapphire Resonator Technique for Measuring the Complex Surface Impedance versus Temperature of HTS Thin Films"

R. R. Fletcher, J.A. Cook, and R.R. Biggers

Fall MRS Mtg., Boston, MA (29Nov-3Dec 1993)

"Ion Implantation Damage and Annealing in GaSb"

S. Iyer, R. Parakkat, B. Patnaik, N. Parikh, and S. Hegde

Fall MRS Mtg., Boston, MA (29Nov-3Dec 1993)

"A Study of Magnetic-Field-Induced Semimetal to Semiconductor Transition in $\text{Al}_x\text{Ga}_{1-x}\text{Sb}/\text{InAs}$ Quantum Well"

Ikai Lo, W.C. Mitchel, and J.-P. Cheng

Fall MRS Mtg., Boston, MA (29Nov-3Dec 1993)

(Invited) "Deep Level Defects, Luminescence, and the Electro-Optic Properties of SiGe/Se Heterostructures"

Pallab Bhattacharya, Shin Hwa Li, and Steve Smith

Fall MRS Mtg., Boston, MA (29Nov-3Dec 1993)

"Highly Energetic and Non-Uniform PLD Plume grows Significantly Different $\text{YBa}_2\text{Cu}_3\text{O}_7$ Films on Side-By-Side Substrates"

Rand R. Biggers, Iman Maartense, David Demspey, M. Grant Norton, T.L. Peterson and Richard Fletcher

1994 Gordon Research Conference , Oxnard CA (January 1994)

"Photoconductivity Measurements of GaInP/GaAs Quantum Well Infrared Detector Structures"

G.J. Brown

Wkshp. on Compound Semiconductor Materials and Devices, San Francisco, CA (20-23 February 1994)

"Silicon Carbide Substrates for High Power Microwave Applications"

W.C. Mitchel

Wkshp. on Compound Semiconductor Materials and Devices, San Francisco, CA (20-23 February 1994)

(Invited)"Microwave transmission and reflection of the high-temperature superconductor YBaCuO "

E. K. Moser

Wright State University Colloquium (Feb. 1994)

"Low Temperature PL Characteristics of Te Doped LPEE Grown GaSb and Devices,"

S. Iyer, G. Qiu, L. Small, S. M. Hegde, K. K. Bajaj

Bull. Am. Phys. Soc. 39, 211 (March 1994)

"Electroluminescence in the Rigid-Rod Polymer (p-phenylenebenzobisthiazole) (PBZT),"
J. B. Ferguson, R. J. Spry, A. K. Agrawal, J. W. Lee, S. M. Hegde, S. J. Bai, C. S. Wang
Bull. Am. Phys. Soc. 39, 99 (March 1994)

"Prediction of Giant $\chi^{(3)}$ Values from a Calculation of Excitonic Nonlinear Optical Properties in Rectangular GaAs Quantum Well Wires"
F. L. Madarasz, Frank Szmulowicz, F.K. Hopkins, and D.L. Dorsey
Bull. Am. Phys. Soc. 39, 145 (March 1994)

"Derivation of a General Expression for the Momentum Matrix Elements Within the Envelope-Function Approximation"
Frank Szmulowicz
Bull. Am. Phys. Soc. 39, 145 (March 1994)

"Calculation and Measurement of the Bound-to-Continuum Absorption in a p-type GaAs/AlGaAs Quantum Well"
Frank Szmulowicz and Gail J. Brown
Bull. Am. Phys. Soc. 39, 146 (March 1994)

"Oscillations in the Cyclotron Resonance of Semimetallic InAs/Al_xGa_{1-x}Sb Single Quantum Wells"
J. Kono, B.D. McCombe, J.-P. Cheng, I. Lo, W.C. Mitchel
Bull. Am. Phys. Soc. 39, 676 (March 1994)

"Luminescence Study of the Ordered Nonlinear Optical Semiconductor ZnGeP₂"
J.E. McCrae, R.L. Hengehold, Y.K. Yeo, P.H. Ostdek, M.C. Ohmer, T.G. Schunemann, and T.M. Pollack
Bull. Am. Phys. Soc. 39, 807 (March 1994)

"Observation of New Far-IR Transition in InAs/AlGaSb Confined Structures"
J.-P. Cheng, J. Kono, B.D. McCombe, I. Lo, and W.C. Mitchel
Bull. Am. Phys. Soc. 39, 676 (March 1994)

"Persistent Photocurrent in thin, undoped GaInP/GaAs Quantum Well"
S. Elhamri, M. Ahoujja, R.S. Newrock, W.C. Mitchel, Ikai Lo, M. Razeghi, and X. He
Bull. Am. Phys. Soc. 39, 749 (March 1994)

(Invited) "Nonlinear Optical Crystals Opportunities"
Nils C. Fernelius
Workshop on Materials Research and Development Opportunities in the Former Soviet Union, National Academy of Sciences, Washington, DC (22 March 1994)

"Characterization of Defects in n-type 6H-SiC Single Crystals by Optical Admittance Spectroscopy"
A.O. Ewvaraye, S.R. Smith, and W.C. Mitchel
Spring MRS Mtg. San Francisco, CA (Apr 1994)

"Chemical Beam Epitaxy and Laser-Enhanced CBE of GaAs using Tris-dimethylaminoarsenic"
H. K. Dong, N. Y. Li, C. W. Tu, and W. C. Mitchel
MRS Spring Meeting, San Francisco, CA (Apr 1994)

"Striking Differences in the Properties of YBa₂Cu₃O₇ Thin Films, Grown Side-by-side by PLD at Power Densities of ~10⁹ W/cm²"
R.R. Biggers, I. Maartense, D. Dempsey, M.G. Norton, T.L. Peterson, and R. Fletcher
Spring MRS Mtg., San Francisco, CA (Apr 1994) Symposium S: High-Temperature Superconductors-Multilayers, Interfaces, and Applications.

"Examination of Particles and Outgrowths on the Surface of Epitaxial YBa₂Cu₃O₇ Thin Films"
M.G. Norton, R.R. Biggers, I. Maartense and J.L. Brown
Spring MRS Mtg., San Francisco, CA (Apr 1994) Symposium F: Epitaxial Oxide Thin Films and Heterostructures,

"Multi-Component Behavior of YBCO Films made by Pulsed Laser Deposition"
I. Maartense, R.R. Biggers, T.L. Peterson, and M.G. Norton
Spring MRS Mtg., San Francisco, CA (Apr 1994) Symposium S: High-Temperature Superconductors-Multilayers, Interfaces, and Applications.

"The Effect of Oxygen Annealing on the Superconductive Properties of 2223-TlBaCaCuO Thin Films"
I. Maartense, T. L. Peterson, W. L. Holstein, and L. A. Parisi
Spring MRS Meeting, San Francisco CA (Apr 1994) Symposium S: High-Temperature Superconductors-Multilayers, Interfaces, and Applications.

FY95 WUDDA, WUD#48-Electronic & Optical Materials-2305FOFJ, December 1994

"A Monte Carlo Model of GaAs [111]B Epitaxy"

D.L. Dorsey, R. Venkatasubramanian, M.Y. Yen, and T.W. Haas
Spring MRS meeting, San Francisco, CA (April 1994)

"Growth, Processing, and Optical Properties of ZnGeP₂"

M.C. Ohmer, F.K. Hopkins, R. DeDomenico, V.A. McMillan, and P.J. Drevinsky
TTCP Workshop on Mid-Infrared Lasers, Quebec City, Canada (April 1994)

"Electrical properties of GaAs Grown by MOMBE with triethylgallium and tris-dimethylaminoarsenic," W. C. Mitchel, Matthew Roth, H. K. Dong, N. I. Li, and C. W. Tu

Electronic Materials Conference, Boulder, CO (Jun 1994)

"Investigation of High Field Effects in Silicon Carbide,"

T. S. Sudarshan, G. Gardinaru, G. Korony, W. C. Mitchel, and W. C. Nunnally
International Conference on High Temperature Electronics, Charlotte, NC (5-10 Jun 1994)

"Characterization of Impurity Incorporation in 6H-SiC Grown By Physical Vapor Transport,"

N. I. Buchan, S. Choi, D. Henshall, W. S. Yoo, M. A. Tischler, M. Roth, and W. C. Mitchel
International Conference on High Temperature Electronics, Charlotte, NC (5-10 Jun 1994)

"Ohmic Contacts to 6H-SiC Semiconductors"

S. Adams, C. Severt, J. Leonard, S. Liu, and S.R. Smith
International Conference on High Temperature Electronics, Charlotte, NC (5-10 Jun 1994)

"Electron and Scanning Probe Microscopies in the Study of YBa₂Cu₃O₇ Thin Film Growth"

M. Grant Norton, Rand R. Biggers, Iman Maartense, E. K. Moser, and Jeff L. Brown
52nd. Annual Meeting of the Microscopy Society of America, New Orleans LA (July 1994)

"New Nonlinear Optical Crystals for Infrared Countermeasures"

F. Kenneth Hopkins & Nils C. Fernelius
Paper E-7 at the 1994 IRIS Materials Specialty Group Sysposium, Boulder, CO (16 August 94)

"Calculation and Measurement of the Bound-to-Continuum Infrared Absorption in p-Type GaAs/AlGaAs Quantum Wells"

F. Szmulowicz and G.J. Brown
7th International Conf. of Superlattices, Microstructures and Microdevices (ICSMM-7), Banff, Alberta, Canada (22-26 August 1994)

"Pressure as a Probe of Deep Levels and Defects in Semiconductors: Antisites and Oxygen in GaAs,"

G. A. Samara, M. Skowronski, and W. C. Mitchel
6th Int'l Conf. on High Pressure Semiconductor Physics, Vancouver, BC (Aug 1994)

"Deep Levels in undoped, bulk 6H-SiC and associated impurities: Application of optical admittance spectroscopy to SiC"

W. C. Mitchel, M. Roth, S. R. Smith, A. O. Evwaraye, and J. S. Solomon

21st International Symposium on Compound Semiconductors, San Diego, CA (18-22 Sep 94)

6.6 SUBMITTED/ACCEPTED FOR PRESENTATION IN FY95

(Invited) "The Physics of Normal Incidence Absorption in p-type GaAs/AsGaAs Quantum Well Infrared Detectors"

G.J. Brown and F. Szmulowicz
2nd Intl. Symp. on 2-20μm Wavelength Infrared Detectors: Physics and Applications, Miami, FL (10-12 Oct 1994)

"Improved Sellmeier Coefficients for Potassium Titanyl Arsenate, KTiOAsO₄ (KTA)"

D.L. Fenimore, K.L. Scheppler, U.B. Ramabadran, and Sandy McPherson
10th Interdisciplinary Laser Science Conference (ILS-X), Dallas TX (2-7 October 1994)

"Growth and Characterization of Gallium Selenide Crystals for Far-Infrared Conversion Devices"

N.B. Singh, T. Henningsen, J.P. McHugh, D.R. Suhre, R.Mazelsky, N. Fernelius & F.K. Hopkins
American Conference on Crystal Growth - East, Atlantic City, NJ (4-7 October 1994)

"Microwave properties of YBa₂Cu₃O_{7-x} films determined from transmission and reflection"

E. K. Moser
Applied Superconductivity Conference, Boston, MA (16-21 October 1994)

"Microstructure and Properties of $\text{YBa}_2\text{Cu}_3\text{O}_7$ Thin Films Grown on Vicinal LaAlO_3 Substrates"
R.R. Biggers, M.G. Norton, I. Maartense, T.L. Peterson, E.K. Moser, D. Dempsey, M.A. Capano, J. Talvacchio, J.L. Brown,
and J.D. Wolf
Applied Superconductivity Conference, Boston, MA (16-21 October 1994)

"Self-Heating Hotspot Effects in HTS Thin Films"
T.L. Peterson, I. Maartense, and Rand R. Biggers
Applied Superconductivity Conference, Boston, MA (16-21 October 1994)

"Transport Properties of YBCO Films on Ultra-Thin Ag Layers"
C. Zhong, S.T. Ruggiero, R. Fletcher, and E. Moser
Applied Superconductivity Conference, Boston, MA (16-21 October 1994)

"Theoretical Study of Step Roughening Dynamics on Vicinal GaAs [111]B Surfaces"
D.L. Dorsey, R. Venkatasubramanian and K. Mahalingam
Fall MRS Meeting, Boston, MA (Nov/Dec 1994)

"Kinetics of Indium Incorporation during MBE of Indium Arsenide: A Monte Carlo Simulation Study"
K. Mahalingam, D.L. Dorsey and R. Venkatasubramanian
Fall MRS Meeting, Boston, MA (Nov/Dec 1994)

"Heuristic Rules for Group-IV Dopant Site Selection in III-V Compounds"
R. Venkatasubramanian, K. Mahalingam and D.L. Dorsey
Fall MRS Meeting, Boston, MA (Nov/Dec 1994)

"New Polymer Materials for Optical Applications--Chitosan and Its Derivatives"
Hao Jiang, Weijie Su, Steve Caracci, Tomas Cooper, Tim Bunning, Robert Crane and W Adams
Fall MRS Meeting, Boston, MA (Nov/Dec 1994)

"Electron Beam Processing of ZnGeP_2 , A Nonlinear Optical Material for the Infrared"
P. J. Drevinsky, P. G. Schunemann, T. M. Pollak, M. C. Ohmer, W. C. Mitchel, and N. C. Fernelius
Symposium A- Beam-Solid Interactions for Materials Synthesis and Characterization, Fall MRS Meeting, Boston, MA
(Nov/Dec 1994)

"Gamma Ray Processing Of ZnGeP_2 , A Nonlinear Optical Material For The Infrared"
P. J. Drevinsky, P. G. Schunemann, and T. M. Pollak, M. C. Ohmer
Symposium A- Beam-Solid Interactions for Materials Synthesis and Characterization, Fall MRS Meeting, Boston, MA
(Nov/Dec 1994)

"Examination of Outgrowths and Other $\text{YBa}_2\text{Cu}_3\text{O}_7$ Thin Film Properties as a Function of Laser Frequency"
Rand R. Biggers, Iman Maartense, David Dempspey, M. Grant Norton, E. Moser, and Jeff Brown
Fall MRS Meeting, Boston, MA (Nov/Dec 1994)

"Thermal and Optical Admittance Studies of High Resistivity 6H-SiC"
A.O. Evvaraye, S.R. Smith, and W.C. Mitchel
Spring MRS Meeting, San Francisco, CA (17-21 April 1995)

"Frequency Characteristics of Metal-Semiconductor Contacts on 6H-SiC,"
S. R. Smith, A. O. Evvaraye, and W. C. Mitchel
Spring MRS Meeting, San Francisco, CA (17-21 April 1995)

"Temperature Dependence of Metal-Semiconductor Contacts on 6H-SiC,"
S. R. Smith, A. O. Evvaraye, and W. C. Mitchel
Spring MRS Meeting, San Francisco, CA (17-21 April 1995)

6.0 PATENTS, SCIENTIFIC PUBLICATIONS, & PRESENTATIONS

6.1 PATENTS

"Laminated Upper Cladding Structure For A Light Emitting Device"
Mike Ludowise, Nick Holonyak Jr., Steve Caracci, Michael Krames, Fred Kish
Number 08/193,681

"Modified GaSe Crystals for High Power NLO Applications"
N.B. Singh, V. Balakrishna, T. Henningsen, J.D. Adam and N.C. Fernelius
Westinghouse Disclosure No. RDS 95-022

"Improvement in GaSe Crystals by Annealing"
N.B. Singh, V. Balakrishna, T. Henningsen, J.D. Adam and N.C. Fernelius
Westinghouse Disclosure No. RDS 95-023

6.2 FY95 PUBLICATIONS

6.2.1 Ph.D. Thesis:

"A Study of p-Type GaAs/AlGaAs Multi-Quantum Well Materials for Normal Incidence Detection of Infrared Radiation"
Gail J. Brown
Doctoral Dissertation, University of Dayton, Dept. of Materials Science (1994)

6.2.2 M.S. Thesis

"LP-MOCVD Growth and Characterization of III-Nitrides"
Adam Saxler
M.S. Thesis, Northwestern University, Electrical Engineering Dept. (1995)

6.2.3 Invited Publications/Presentations:

(Invited Book Chapter)
"Normal Incidence Detection of Infrared Radiation in P-type GaAs/AlGaAs Quantum Well Structures"
G. J. Brown and F. Szmulowicz
Long-Wavelength Infrared Detectors, ed. M. Razeghi, Gordon Breach Publishers, Inc., Philadelphia, PA (1995)

(Invited)"Modeling of Normal Incidence Absorption in p-Type GaAs/AlGaAs Quantum Well Infrared Detectors"
G.J. Brown and F. Szmulowicz
Optoelectronic Integrated Circuit Materials, Physics and Devices eds. M. Razeghi, Y.S. Park and G.L. Witt,
SPIE Proc. 2397, 461 (1995)

(Invited) "A calculation of third-order optical susceptibilities due to excitonic nonlinearities in rectangular GaAs/AlGaAs quantum well wires with finite Al-graded band offsets included"

F.L. Madarasz, F. Szmulowicz and F.K. Hopkins
Optoelectronic Integrated Circuit Materials, Physics and Devices eds. M. Razeghi, Y.S. Park and G.L. Witt,
SPIE Proc. 2397, 134 (1995)

(Invited) "The Physics of Normal Incidence Absorption in p-type GaAs/AlGaAs Quantum Well Infrared Detectors"

G.J. Brown and F. Szmulowicz
Long-Wavelength Infrared Detectors: Physics and Applications, eds. V. Swaminathan, S. Li, T.S. Faska, H.C. Liu and F. Radpour, Electrochem. Soc. Proc. 94-30, 164 (1995)

(Invited George Rappaport Award Lecture) "My work in Various Spectroscopies"

Nils Fernelius
Ohio Valley Section of the Society for Applied Spectroscopy, Fairborn, OH (11 May 1995)

6.2.4 Published in Refereed Journals:

(Review) "Properties of Gallium Selenide Single Crystal"

Nils C. Fernelius
Progress in Crystal Growth and Characterization of Materials **28**, 275-353 (1994)

"Direct Measurement of ZnGeP₂ Birefringence from 0.66 to 12.2 μm Using Polarized Light Interference"

D.W. Fischer, M.C. Ohmer, P.G. Schunemann, and T.M. Pollak
J. Appl. Phys. **77**, 5942 (1995)

"Infrared corrected Sellmeier coefficients for potassium titanyl arsenate"

D.L. Fenimore, K.L. Schepler, Uma B. Ramabadran and S.R. McPherson
J. Opt. Soc. Am., **B12**, 794 (1995)

"Defects responsible for gray tracks in flux-grown KTiOPO₄"

M.P. Scripsick, D.N. Lalacono, J. Rottenberg, S.H. Goellner, L.E. Halliburton and F.K. Hopkins
Appl. Phys. Lett. **66**, 3428 (1995)

"Excitonic Nonlinear Optical Processes in GaAs Quantum Well Wires"

R.O. Klepfer, F.L. Madarasz, and F. Szmulowicz
Phys. Rev. B **51**, 4633 (1995)

"Temperature and Many Body Effects on the Intersubband Transition in a GaAs/Al_{0.3}Ga_{0.7}As Multiple Quantum Well"

F. Szmulowicz, M.O. Manasreh, C.E. Stutz, and T. Vaughan
Phys. Rev. B **50**, 11618 (1994)

"Calculation and Photoresponse Measurement of the Bound-to-Continuum Infrared Absorption in p-type GaAs/AlGaAs Quantum Wells"

Frank Szmulowicz and Gail J. Brown
Phys. Rev. B **51**, 13203 (1995)

"Superlattice Parameters for Optimum Absorption in InAs/InGaSb Superlattice Infrared Detectors"

E.R. Heller, K. Fisher, F. Szmulowicz and F.L. Madarasz
J. Appl. Phys. **77**, 5739 (1995)

"Background Limited Performance in p-doped GaAs/GaInAsP Quantum Well Infrared Photodetectors"

J. Hoff, S. Kim, M. Erdtmann, R. Williams, J. Piotroski, E. Bigan, M. Razeghi and G.J. Brown
Appl. Phys. Lett. **67**, 22 (1995)

"Calculation of Resonant Absorption and Photoresponse Measurement in p-type GaAs/AlGaAs Quantum Wells"

Frank Szmulowicz and Gail J. Brown
Appl. Phys. Lett. **66**, 1659 (1995)

"Photoresponse Study of Normal Incidence Detection in P-Type GaAs/AlGaAs MQWs"

G.J. Brown, F. Szmulowicz, and S.M. Hegde
Journal of Electron. Mat. **24**, 559 (1995)

"Derivation of a General Expression for the Momentum Matrix Elements within the Envelope-Function Approximation"
F. Szmulowicz
Phys. Rev. B **51**, 1613 (1995)

"P-doped GaAs/GaInP Quantum Well Intersubband Photodetectors"
J. Hoff, X. He, M. Erdtmann, E. Bigan, M. Razeghi and G.J. Brown
J. Appl. Phys. **78**, 2126 (1995)

"Molecular-beam-epitaxy doping kinetics: A rate equation model"
S. Bendi, R. Venkatasubramanian and D. L. Dorsey
J. Appl. Phys. **76**, 5202 (1994)

"Electronic properties of AlGaSb/InAs quantum wells,"
I. Lo, W. C. Mitchel, and J.-P. Cheng,
Phys Rev B **50**, 5816 (1994).

"Evidence for a Stable Excitonic Ground State in a Spatially Separated Electron-Hole System"
J.-P. Cheng, J. Kono, B.D. McCombe, I. Lo, W.C. Mitchel, and C.E. Stutz
Phys Rev Lett. **74**, 450 (1995)

"Low temperature photoluminescence of Te-doped GaSb grown by liquid phase electro-epitaxy"
S. Iyer, L. Small, S.M. Hegde, K.K. Bajaj and A. Abul-Fadl
J. Appl. Phys. **77**, 5902 (1995)

"Second subband population in δ -doped AlInAs/GaInAs heterostructures"
I. Lo, W. C. Mitchel, M. Ahoujja, J.-P. Cheng, A. Fathimulla and H. Mier
Appl. Phys Lett. **66**, 754 (1995)

"Interface roughness scattering in thin, undoped GaInP/GaAs quantum wells,"
W. C. Mitchel, G. J. Brown, I. Lo, S. Elhamri, M. Ahoujja, K. Ravindran, R. S. Newrock, M. Razeghi, and X. He,
Appl. Phys. Lett. **65**, 1578 (1994).

"Observation of a negative persistent photoconductivity effect in InGaSb/InAs quantum wells,"
I. Lo, W. C. Mitchel, R. Kaspi, S. Elhamri, and R. S. Newrock,
Appl. Phys. Lett. **65**, 1024 (1994).

"Determination of alloy composition in modulation doped AlGaAs/GaAs heterostructure"
D.P. Wang, Ikai Lo, J.L. Chern and W.C. Mitchel
J. Appl. Phys. **77**, 172 (1995)

"A Study of Chemical Beam Epitaxy of GaAs Using Tris-dimethylaminoarsenic"
H.K. Dong, N.Y. Li, C.W. Tu, M. Geva and W.C. Mitchel
J. Electron. Mats. **24**, 69 (1995)

"Persistent photoconductivity in thin undoped GaInP/GaAs quantum wells,"
S. Elhamri, M. Ahoujja, K. Ravindran, R. S. Newrock, W. C. Mitchel, G. J. Brown, I. Lo,
Manijeh Razeghi and X. He
Appl. Phys. Lett. **66**, 171 (1995)

"General expression for optical transition probabilities in the envelope-function approximation"
Frank Szmulowicz
Pis'ma Zh. Eksp. Teor. Fiz. **60**, 731 (1994)
JETP Lett. **60**, 751 (1994)

"Temperature Dependence of Photoluminescence Linewidth in Modulation Doped Pseudomorphic High Electron Mobility Transistor $Al_xGa_{1-x}As/In_yGa_{1-y}As/GaAs$ Structures"
P.W. Yu, B. Jogai, T.J. Rogers, P.A. Martin, and J.M. Ballingall
Appl. Phys. Lett. **65**, 3263 (1994)

"Cyclotron-resonance oscillations in a two-dimensional electron-hole system"

J. Kono, B.D. McCombe, J.-P. Cheng, I. Lo, W.C. Mitchel and C.E. Stutz
Phys. Rev. B 50, 12242 (1994)

"High quality AlN and GaN epilayers grown on (00•1) sapphire, (100) and (111) silicon substrates"

P. Kung, A. Saxler, X. Zhang, D. Walker, T.C. Wang, I. Ferguson and M. Razeghi
Appl. Phys. Lett. 66, 2958 (1995)

"Growth of AlGaN:Ge on sapphire and silicon substrates"

X. Zhang, P. Kung, A. Saxler, D. Walker, T.C. Wang and M. Razeghi
Appl. Phys. Lett. 67, 1745 (1995)

"Persistent photoconductance in n-type 6H-SiC"

A.O. Evwaraye, S.R. Smith and W.C. Mitchel
J. Appl. Phys. 77, 4477 (1995)

"Vanadium Related near-band-edge Absorption Bands in three SiC polytypes"

J.R. Jenny, M. Skowronski, W.C. Mitchel, H.M. Hobgood, R.C. Glass, G. Augustine and R.H. Hopkins
J. Appl. Phys. 78, 3160 (1995)

"On the compensation mechanism in high-resistivity 6H-SiC doped with vanadium"

J.R. Jenny, M. Skowronski, W.C. Mitchel, H.M. Hobgood, R.C. Glass, G. Augustine and R.H. Hopkins
J. Appl. Phys. 78, 3839 (1995)

"Semi-insulating 6H-SiC Grown by Physical Vapor Transport"

H.McC. Hobgood, R.C. Glass, G. Augustine, R.H. Hopkins, J. Jenny, M. Skowronski, W.C. Mitchel and M. Roth
Appl. Phys. Lett. 68, 1364 (1995)

"Kinetics of slow buildup of photoconductance in n-type 6H-SiC"

A. O. Evwaraye, S. R. Smith and W. C. Mitchel
Appl. Phys. Lett. 66, 2691 (1995).

"Examination of electrical and optical properties of vanadium in bulk n-type silicon carbide"

A O. Evwaraye, S. R. Smith and W. C. Mitchel
J. Appl. Phys. 76, 5769 (1994)

"*In Situ* Transmission Electron Microscopy Observations of Twinning
in Lanthanum Aluminate"

M. Grant Norton and Rand R. Biggers
Scripta Metallurgica et Materialia 32, 481 (1995)

"Surface Outgrowths on Laser-Deposited $\text{YBa}_2\text{Cu}_3\text{O}_7$ Thin Films"

M.G. Norton, R.R. Biggers, I. Maartense, E. K. Moser and J.L. Brown
Physica C 233, 321 (1994)

"YBCO Film Growth on Ultra-Thin Ag Layers"

C. Zhong, S.T. Ruggiero, R. Fletcher and E. Moser
J. of Matls. Res. 9, 2761 (1994)

"Defects and Anomalous Film Growth at the edge of single Crystal Substrates"

M. Grant Norton, Rand R. Biggers, and Iman Maartense
J. of Materials Science Letters 14, 851 (1995)

6.2.5 Published in Refereed Conference Proceedings:

"Aluminum-free Quantum Well Intersubband Photodetectors with p-Type GaAs Wells and Lattice-matched Ternary
and Quaternary Barriers"

J. Hoff, E. Bigan, G.J. Brown and M. Razeghi
Optoelectronic Integrated Circuit Materials, Physics and Devices eds. M. Razeghi, Y.S. Park and G.L.
Witt, SPIE Proc. 2397, 445 (1995)

"Intersubband Transitions in InGaAs/AlGaAs Multiple Quantum Wells"

F. Szmulowicz, M.O. Manasreh, C. Kutsche, and C.E. Stutz
Mat. Res. Soc. Symp. Proc. **299**, 53 (1994)

"Chemical Beam Epitaxy (CBE) and Laser-Enhanced CBE of GaAs using Tris-dimethylaminoarsenic"

H.K. Dong, N.Y. Li, C.W. Tu, M. Geva and W.C. Mitchel
MRS Symposium Proceedings Series **340**, 173 (1994)

"Rapid thermal annealing effects on the structural integrity of InAlAs/GaAsSb HIGFET epilayers on InP"

K.G. Merkel, D.L.A. Cernay, R.T. Lareau, V.M. Bright, P.W. Yu and F.L. Schuermeyer
Inst. Phys. Conf. Ser. **141**, 727 (1995)

"Growth of InGaP₂ by LP-MOCVD and Characterization of Lattice Ordering"

V. E. Stenger, P. B. Kosel, S. M. Hegde, and M. C. Ohmer
Proc. of SOTAPoCS XVIII, Electrochem. Soc. Proc. **93-27**, 75 (1994)

"Low Pressure Metalorganic Chemical Vapor Deposition of High Quality AlN and GaN Thin Films on Sapphire and Silicon Substrates"

P. Kung, X. Zhong, E. Bigan, M. Razeghi and A. Saxler
Optoelectronic Integrated Circuit Materials, Physics and Devices eds. M. Razeghi, Y.S. Park and G.L. Witt, SPIE Proc. **2397**, 311 (1995)

"Characterization of Deep Defects in n-type 6H-SiC Single Crystals by Optical Admittance Spectroscopy"

A.O. Evwaraye, S.R. Smith, and W.C. Mitchel
Mater. Res. Soc. Proc. **339**, 711 (1994)

"Temperature Dependence of Metal-Semiconductor Contacts on 6H-SiC,"

S. R. Smith, A. O. Evwaraye, and W. C. Mitchel
Proc. Mats. Res. Soc. **378**, 835 (1995)

"Study of Deep Levels by Admittance Spectroscopy in High Resistivity p-type 6H-SiC single Crystals"

A.O. Evwaraye, S.R. Smith and W.C. Mitchel
Proc. Mats. Res. Soc. **378**, 539 (1995)

"Deep Levels in Undoped Bulk 6H-SiC and Associated Impurities: Application of Optical Admittance Spectroscopy"

W.C. Mitchel, Matthew Roth, S.R. Smith, A.O. Evwaraye, and J. Solomon
Inst. Phys. Conf. Ser. **141**, 411 (1995)

"Examination of Particles and Outgrowths on the Surface of Epitaxial YBa₂Cu₃O₇ Thin Films"

M.G. Norton, R.R. Biggers, I. Maartense and J.L. Brown
Epitaxial Oxide Thin Films and Heterostructures
Mat. Res. Soc. Symp. Proc. **341**, 183 (1994)

"Electron and Scanning Probe Microscopies in the Study of YBa₂Cu₃O₇ Thin Film Growth"

M. G. Norton, R. R. Biggers, I. Maartense, E. K. Moser, and J. L. Brown
Proceedings of the 52nd Annual Meeting of the Microscopy Society of America, p. 810 (1994)

"Microstructure and Properties of YBa₂Cu₃O₇ Thin Films Grown on Vicinal LaAlO₃ Substrates"

R.R. Biggers, M.G. Norton, I. Maartense, T.L. Peterson, E.K. Moser, D. Dempsey, M.A. Capone, J. Talvacchio, J.L. Brown, and J.D. Wolf
IEEE Trans. on Appl. Supercond. **5**, 1241 (1995)

"Self-Heating Hotspot Effects in HTS Thin Films"

T.L. Peterson, I. Maartense, and Rand R. Biggers
IEEE Trans. on Appl. Supercond. **5**, 1436 (1995)

"Transport Properties of YBCO Films on Ultra-Thin Ag Layers"

C. Zhong, S.T. Ruggiero, R. Fletcher, and E. Moser
IEEE Trans. on Appl. Supercond. **5**, 1529 (1995)

6.2.6 Non-Refereed Publications:

"New Nonlinear Optical Crystals for Infrared Countermeasures"

F. Kenneth Hopkins & Nils C. Fernelius

Proceedings 1994 IRIS Materials Specialty Group Symposium, p. 353 (August 1994)

"Computational Methods for Modeling Semiconductor Thin-Film Epitaxy"

D. L. Dorsey

Mini-Symposium on Computational Materials Science Research

eds. R. Pachter, B. L. Farmer and W. Adams, (WL-TR-95-4008) (1995)

"Infrared Materials: Nonlinear Materials Extend Spectral Range of High-Power Lasers"

F.Kenneth Hopkins

Laser Focus World **31**, 87 (July 1995)

"Nonlinear Optical Crystal Development at the USAF Wright Laboratory"

F.K. Hopkins, N.C. Fernelius, M.C. Ohmer, D.E. Zelmon and U.B. Ramabadran

Proc. National Aerospace Electron. Conf. (NAECON), p. 914 (1995)

6.3 ACCEPTED FOR PUBLICATION

"Exciton/biexciton energies in rectangular GaAs/AlGaAs quantum well wires including finite Al-graded band offsets with application to third-order optical susceptibilities"

F.L. Madarasz, F. Szmulowicz and F.K. Hopkins

Phys. Rev. B

"Persistent Photoconductivity Effect in d-doped AlInAs/GaInAs Heterostructures"

I. Lo, D.P. Wang, K.Y. Hsieh, T.F. Wang, W.C. Mitchel, M. Ahoujja, J.-P. Cheng, A. Fathimulla and H. Hier

Phys. Rev. B

"Determination of the band offsets of the 4H-SiC/6H-SiC heterojunction using the vanadium donor (0/+) level as a reference"

A. O. Evwaraye, S. R. Smith, and W. C. Mitchel

Appl. Phys. Lett.

"Optical admittance studies of vanadium donor level in high resistivity p-type 6H-SiC,"

A. O. Evwaraye, S. R. Smith, and W. C. Mitchel

J. Appl. Phys.

"High field effects in high resistivity silicon carbide in lateral configurations"

T. S. Sudarshan, G. Gradinaru, G. Korony, W. Mitchel and R. H. Hopkins

Appl. Phys. Lett.

"Atomistic Calculations of Defects in ZnGeP₂"

P. Zapol, R. Pandey, M.C. Ohmer and J. Gale

J. Appl. Phys.

"Electron Beam Processing of ZnGeP₂, A Nonlinear Optical Material for the Infrared"

P. G. Schunemann, P. J. Drevinsky, M. C. Ohmer, W. C. Mitchel, and N. C. Fernelius

Proceedings Symposium A- Beam-Solid Interactions for Materials Synthesis and Characterization, Mats. Res. Soc. (1995)

"Gamma Ray Processing of ZnGeP₂, A Nonlinear Optical Material For The Infrared"

P. G. Schunemann, P. J. Drevinsky and M. C. Ohmer

Proceedings Symposium A- Beam-Solid Interactions for Materials Synthesis and Characterization, Mats. Res. Soc. (1995)

"Observations on the growth of YBaCuO thin films at very high laser fluences"

R.R. Biggers, M.G. Norton, I. Maartense, T.L. Peterson, E.K. Moser, D. Dempsey and J.L. Brown

Film Synthesis and Growth Using Energetic Beams

Mats. Res. Soc. Symposium Proc. (1995)

"Spectroscopic Ellipsometric Characterization of Low Temperature GaAs"

X. Gao, P.G. Snyder, P.W. Yu, Y.Q. Zhang and Z.F. Peng

Proc. Mats. Res. Soc. (1995)

"Optimization of Absorption in InAs/InGaSb Superlattices for Long Wavelength Infrared Detection"

F. Szmulowicz, E.R. Heller, K. Fisher and F.L. Madarasz

Superlatt. Microstruct.

"Analysis of Spectral Response in p-type GaAs/GaInP Quantum Well Infrared Photodetectors"

J. Hoff, C. Jelen, S. Slivken, E. Bigan, M. Razeghi and G.J. Brown

Superlatt. Microstruct.

"Persistent Photoconductivity in Thin Undoped GaInP/GaAs Quantum Wells"

M. Ahoujja, S. Elhamri, D.B. Mast, R.S. Newrock, W.C. Mitchel, G.J. Brown, M. Razeghi and X. He

Superlatt. Microstruct.

"Interface Roughness Scattering in Thin, Undoped GaInP/GaAs Quantum Wells"

S. Elhamri, M. Ahoujja, D.B. Mast, R.S. Newrock, W.C. Mitchel, G.J. Brown, M. Razeghi and X. He

Superlatt. Microstruct.

"Characterization of Boron in 6H-SiC Using Optical Absorption"

P.W. Yu, K. Mahalingam, W.C. Mitchel, M.D. Roth and D.W. Fischer

Proceedings of the 22nd International Symposium on Compound Semiconductors, Cheju Island,

Korea (28 Aug - 2 Sept 1995)

"Background Limited Performance in p-doped GaAs/GaInPsP Quantum Well Infrared Photodetectors"

J. Hoff, S. Kim, M. Erdtmann, R. Williams, J. Piotrowski, E. Bigan, G.J. Brown and M. Razeghi

Proceedings of the 22nd International Symposium on Compound Semiconductors, Cheju Island,

Korea (28 Aug - 2 Sept 1995)

"Determination of the Conduction Band Discontinuity in an n-type 3C-SiC/6H-SiC Heterojunction"

S.R. Smith, A.O. Evwaraye, A.J. Steckl, C. Yuan, W.C. Mitchel and M.D. Roth

Proceedings of the 6th International Conf. on Silicon Carbide and Related Materials (ICSCRM-95),

Kyoto, Japan (18-21 Sept 1995)

"Electronic Properties of Semi-insulating Vanadium-doped 6H-SiC"

W.C. Mitchel, M. Roth, A.O. Evwaraye, P.W. Yu, S.R. Smith, J. Jenny, M. Skowronski, H.McD. Hobgood, R.C. Glass, G.

Augustine and R.H. Hopkins

Proceedings of the 6th International Conf. on Silicon Carbide and Related Materials (ICSCRM-95),

Kyoto, Japan (18-21 Sept 1995)

"In Situ Electron Microscopy Study of Structural Transformations on Single Crystal Lanthanum Aluminate"

M. G. Norton, J. Bentley and R. R. Biggers

Proc of the 53rd Annual Meeting of the Microscopy Society of America (1995)

"Scanning Probe Microscopy Study of the Growth of $\text{YBa}_2\text{Cu}_3\text{O}_7$ Thin Films"

M. G. Norton, R. R. Biggers, E. K. Moser, T. L. Peterson and I. Maartense

Proc of the 53rd Annual Meeting of the Microscopy Society of America (1995)

6.4 SUBMITTED FOR PUBLICATION

"Relationship of the Second Order Nonlinear Optical Coefficient to Bandgap in Inorganic Non-Centrosymmetric Crystals"

A.G. Jackson, M.C. Ohmer and S.R. LeClair

Infrared Physics

"Optical and Structural Characterization of Triallyl thiourea Cadmium Chloride (ATCC)"

Uma B. Ramabadran, Rama Vuppuladhadium, D. Small, D.E. Zelmon and G.C. Kennedy

Applied Optics

"A dimensional parametric study of exciton/biexciton energetics in rectangular GaAs/AlGaAs quantum well wires with and without finite band offsets"

R.O. Klepfer, F.L. Madarasz, F. Szmulowicz and F.K. Hopkins
J. Appl. Phys.

"Optical Waveguide and Morphology of Chitosan Thin Films"
H. Jiang, W. Su, S.J. Caracci, T.J. Bunning, T.M. Cooper and W.W. Adams
J. Appl. Polym. Sci.

"Rough Sets Applied to Materials Data"
A.G. Jackson, S.R. LeClair, M.C. Ohmer, W. Ziarko and H. Al-Kamhwi
Acta Metallurgica et Materialia

"Influence of Physisorbed Arsenic on RHEED Intensity Oscillations during Low-Temperature GaAs Molecular Beam Epitaxy"
R. Venkatasubramanian, V. K. Pamula and D. L. Dorsey
J. Appl. Phys.

"Effect of Barrier Material on the Two-Dimensional Electron Gas in δ -doped GaInAs-based Quantum Wells"
I. Lo, W.C. Mitchel, P.W. Yu, A. Fathimulla and H. Hier
Appl. Phys. Lett.

"Deep-center oxygen related photoluminescence in GaAs doped with dimethylaluminum methoxide during organometallic vapor phase epitaxy"
P.W. Yu, Y. Park, M. Skowronski and M.L. Timmons
J. Appl. Phys.

"Shallow and deep levels in n-type 4H-SiC,"
A. O. Evvaraye, S. R. Smith, and W. C. Mitchel
J. Appl. Phys.

"Optical and electrical characterization of boron impurities in silicon carbide grown by physical vapor transport"
J. R. Jenny, M. Skowronski, W. C. Mitchel, H. M. Hobgood, R. C. Glass, G. Augustine and R. H. Hopkins
Journal of Applied Physics.

"Temperature dependence of the barrier height of metal-semiconductor contacts on 6H-SiC,"
S. R. Smith, A. O. Evvaraye and W. C. Mitchel
J. Appl. Phys.

"Kinetics of photoconductivity in n-type GaN photodetector"
P. Kung, X. Zhang, D. Walker, A. Saxler, J. Piotrowski, A. Rogalski and M. Razeghi
Appl. Phys. Lett.

"Photovoltaic effects in GaN structures with p-n junction"
X. Zhang, P. Kung, D. Walker, J. Piotrowski, A. Rogalski, A. Saxler and M. Razeghi
Appl. Phys. Lett.

"High Field Activation of Micropipes in High Resistivity Silicon Carbide"
T.S. Sudarshan, G. Gradinaru, G. Korony, W. Mitchel and R. Hopkins
J. Electron. Matls.

"Electronic Properties of Boron in p-type Bulk 6H-SiC"
W.C. Mitchel, M.D. Roth, A.O. Evvaraye, P.W. Yu and S.R. Smith
J. Electron. Matls.

"Determination of the Activation Energy E_3 for Impurity Conduction in n-type 4H-SiC"
A.O. Evvaraye, S.R. Smith, W.C. Mitchel and M.D. Roth
Appl. Phys. Lett.

(Invited) "Deep Levels in 6H-SiC as Studied by Admittance Spectroscopy Techniques"
W.C. Mitchel, A.O. Evwaraye and S.R. Smith
Wide BandGap Semiconductors and Device Symposium
188th Electrochemical Soc. Mtg. (Oct 1995)

6.5 FY95 PRESENTATIONS (Chronological)

(Invited) "The Physics of Normal Incidence Absorption in p-type GaAs/AsGaAs Quantum Well Infrared Detectors"
G.J. Brown and F. Szmulowicz
2nd Intl. Symp. on 2-20 μ m Wavelength Infrared Detectors: Physics and Applications, Miami, FL (10-12 Oct 1994)

"Improved Sellmeier Coefficients for Potassium Titanyl Arsenate, KTiOAsO₄ (KTA)"
D.L. Fenimore, K.L. Schepler, U.B. Ramabadran, and Sandy McPherson
10th Interdisciplinary Laser Science Conference (ILS-X), Dallas TX (2-7 October 1994)

"Growth and Characterization of Gallium Selenide Crystals for Far-Infrared Conversion Devices"
N.B. Singh, T. Henningsen, J.P. McHugh, D.R. Suhre, R. Mazelsky, N. Fernelius & F.K. Hopkins
American Conference on Crystal Growth - East, Atlantic City, NJ (4-7 October 1994)

"Photoluminescence of Vanadium Doped SiC"
W.A. Davis, R.L. Hengehold, Y.K. Yeo, and W.C. Mitchel
The Bull. of the APS **40**, 1475 (1995)

"Optimization of Absorption in InAs/InGaSb Superlattices for Long Wavelength Infrared Detection"
E.R. Heller, F. Szmulowicz, K. Fisher, and F.L. Madarasz
The Bull. of the APS **40**, 1482 (1995)

"Reflections and Refractions in a Cone: Conchoid of Nicomedes"
F. Szmulowicz
The Bull. of the APS **40**, 1484 (1995)

"Microwave properties of YBa₂Cu₃O_{7-x} films determined from transmission and reflection"
E. K. Moser
Applied Superconductivity Conference, Boston, MA (16-21 October 1994)

"Microstructure and Properties of YBa₂Cu₃O₇ Thin Films Grown on Vicinal LaAlO₃ Substrates"
R.R. Biggers, M.G. Norton, I. Maartense, T.L. Peterson, E.K. Moser, D. Dempsey, M.A. Capone, J. Talvacchio, J.L. Brown,
and J.D. Wolf
Applied Superconductivity Conference, Boston, MA (16-21 October 1994)

"Self-Heating Hotspot Effects in HTS Thin Films"
T.L. Peterson, I. Maartense, and Rand R. Biggers
Applied Superconductivity Conference, Boston, MA (16-21 October 1994)

"Transport Properties of YBCO Films on Ultra-Thin Ag Layers"
C. Zhong, S.T. Ruggiero, R. Fletcher, and E. Moser
Applied Superconductivity Conference, Boston, MA (16-21 October 1994)

"Nonlinear Optical Crystal Development at the USAF Wright Laboratory"
F.K. Hopkins
Physics & Materials Science Joint Seminar, Bowling Green State Univ., OH (9 Nov 94)

"Theoretical Study of Step Roughening Dynamics on Vicinal GaAs [111]B Surfaces"
D.L. Dorsey, R. Venkatasubramanian and K. Mahalingam
Fall MRS Meeting, Boston, MA (Nov/Dec 1994)

"Kinetics of Indium Incorporation during MBE of Indium Arsenide: A Monte Carlo Simulation Study"
K. Mahalingam, D.L. Dorsey and R. Venkatasubramanian
Fall MRS Meeting, Boston, MA (Nov/Dec 1994)

"Heuristic Rules for Group-IV Dopant Site Selection in III-V Compounds"

R. Venkatasubramanian, K. Mahalingam and D.L. Dorsey

Fall MRS Meeting, Boston, MA (Nov/Dec 1994)

"New Polymer Materials for Optical Applications--Chitosan and Its Derivatives"

Hao Jiang, Weijie Su, Steve Caracci, Thomas Cooper, Tim Bunning, Robert Crane and W Adams

Fall MRS Meeting, Boston, MA (Nov/Dec 1994)

"Electron Beam Processing of ZnGeP₂, A Nonlinear Optical Material for the Infrared"

P. G. Schunemann, P. J. Drevinsky, M. C. Ohmer, W. C. Mitchel, and N. C. Fernelius

Symposium A- Beam-Solid Interactions for Materials Synthesis and Characterization, Fall MRS Meeting, Boston, MA (Nov/Dec 1994)

"Gamma Ray Processing of ZnGeP₂, A Nonlinear Optical Material For The Infrared"

P. G. Schunemann, P. J. Drevinsky and M. C. Ohmer

Symposium A-Beam-Solid Interactions for Materials Synthesis and Characterization, Fall MRS Meeting, Boston, MA (Nov/Dec 1994)

"Examination of Outgrowths and Other YBa₂Cu₃O₇ Thin Film Properties as a Function of Laser Pulse Frequency"

Rand R. Biggers, M. Grant Norton, Iman Maartense, E. Moser, T.L. Peterson, D. Demspey and Jeff Brown

Fall MRS Meeting, Symposium H: High Tc Superconductivity: Materials and Applications,

Boston, MA (Nov/Dec 1994)

(Invited)"Modeling of Normal Incidence Absorption in p-Type GaAs/AlGaAs Quantum Well Infrared Detectors"

G.J. Brown and F. Szmulowicz

Optoelectronic Integrated Circuit Materials, Physics and Devices, San Jose, CA (4-10 Feb 1995)

"Aluminum-free Quantum Well Intersubband Photodetectors with p-Type GaAs Wells and Lattice-matched Ternary and Quaternary Barriers"

J. Hoff, E. Bigan, G.J. Brown and M. Razeghi

Optoelectronic Integrated Circuit Materials, Physics and Devices, San Jose, CA (4-10 Feb 1995)

(Invited)"A calculation of third-order optical susceptibilities due to excitonic nonlinearities in rectangular GaAs/AlGaAs quantum well wires with finite Al-graded band offsets included"

F.L. Madarasz, F. Szmulowicz and F.K. Hopkins

Optoelectronic Integrated Circuit Materials, Physics and Devices, San Jose, CA (4-10 Feb 1995)

"Low Pressure Metalorganic Chemical Vapor Deposition of High Quality AlN and GaN Thin Films on Sapphire and Silicon Substrates"

P. Kung, X. Zhong, E. Bigan, M. Razighi and A. Saxler

Optoelectronic Integrated Circuit Materials, Physics and Devices, San Jose, CA (4-10 Feb 1995)

(Invited)"Exciton/Biexciton Energies in Rectangular GaAs/AlGaAs Quantum Well Wires Including Finite Al-Graded Band Offsets With Application to Third-Order Optical Susceptibilities"

Frank L. Madarasz and Frank Szmulowicz

Alabama AM University, Huntsville, AL (2 March 1995).

"Interface roughness scattering in thin GaInP/GaAs quantum wells"

S. Elhamri, M. Ahoujja, K. Ravindran, D.B. Mast, R.S. Newrock, W.C. Mitchel, I. Lo, M. Razeghi and X. He
Bull. Am. Phys. Soc. **40**, 252 (1995); APS March Mtg. San Jose, CA (20-24 Mar 95)

"Persistent photoconductivity in Thin Undoped GaInP/GaAs quantum wells"

M. Ahoujja, S. Elhamri, K. Ravindran, D.B. Mast, R.S. Newrock, W.C. Mitchel, I. Lo, M. Razeghi and X. He
Bull. Am. Phys. Soc. **40**, 698 (1995); APS March Mtg. San Jose, CA (20-24 Mar 95)

"Infrared Magneto Optical Characterization of delta-Doped GaInAs/AlInAs Heterostructures"

J.-P. Cheng, I. Lo, W.C. Mitchel and A. Fathimulla

Bull. Am. Phys. Soc. **40**, 19 (1995); APS March Mtg. San Jose, CA (20-24 Mar 95)

FY96 WUDDA, WUD#48-Electronic & Optical Materials-2305FOFJ, November 1995

"Magneto-optical and Transport Studies of Semiconducting and Semimetallic InAs/AlGaSb Quantum Wells"

J. Kono, B.D. McCombe, J.-P. Cheng, I. Lo, W.C. Mitchel and C.E. Stutz

Bull. Am. Phys. Soc. **40**, 19 (1995); APS March Mtg. San Jose, CA (20-24 Mar 95)

"Polarized Raman scattering from ZnGeP single crystals"

S. Tlali, H.E. Jackson, M.C. Ohmer, P.G. Schunemann and T.M. Pollak

Bull. Am. Phys. Soc. **40**, 760 (1995); APS March Mtg. San Jose, CA (20-24 Mar 95)

"Optical Waveguiding and Morphological Structure of Chitosan Thin Films"

H. Jiang, W. Su, T. Bunning, S. Caracci, T. Cooper and W.W. Adams

Bull. Am. Phys. Soc. **40**, 480 (1995); APS March Mtg. San Jose, CA (20-24 Mar 95)

"Zinc Germanium Diphosphide - A Nonlinear Optical Material for Infrared Applications"

M.C. Ohmer

Materials Eng. Seminar, U. Dayton, (6 April 1995)

"Study of Deep Levels by Admittance Spectroscopy in High Resistivity p-type 6H-SiC Single Crystals"

A.O. Evwaraye, S.R. Smith, and W.C. Mitchel

Spring MRS Meeting, San Francisco, CA (17-21 April 1995)

"Temperature Dependence of Metal-Semiconductor Contacts on 6H-SiC,"

S. R. Smith, A. O. Evwaraye, and W. C. Mitchel

Spring MRS Meeting, San Francisco, CA (17-21 April 1995)

"Observations on the growth of YBaCuO thin films at very high laser fluences"

R.R. Biggers, M.G. Norton, I. Maartense, T.L. Peterson, E.K. Moser, D. Dempsey and J.L. Brown

Symposium Q- Film Synthesis and Growth Using Energetic Beams, Spring MRS Meeting,

San Francisco, CA (17-21 April 1995)

"The Effects of Substrate Misorientation on the Microstructure and Properties of YBaCuO Thin Films"

R.R. Biggers, I. Maartense, E.K. Moser, T.L. Peterson, D. Dempsey and J.L. Brown

Symposium K- High Temperature Superconductors-Material and Fabrication Issues for Applications, Spring MRS Meeting, San Francisco, CA (17-21 April 1995)

"Superconductive Instabilities in (Ba,K)-Bi-O Films"

I. Maartense, T. L. Peterson, R. R. Biggers and R. Hu

Symposium K- High Temperature Superconductors - Material and Fabrication Issues for Applications, Spring MRS Meeting, San Francisco, CA (17-21 April 1995)

"Laser Deposited YBa₂Cu₃O_{7-x} Films with Variations due to Plume Asymmetry"

E. K. Moser, R. R. Biggers, I. Maartense, T. L. Peterson, J. L. Brown and M. G. Norton

Symposium K- High Temperature Superconductors - Material and Fabrication Issues for Applications, Spring MRS Meeting, San Francisco, CA (17-21 April 1995)

"Spectroscopic Ellipsometric Characterization of Low Temperature GaAs"

X. Gao, P.G. Snyder, P.W. Yu, Y.Q. Zhang and Z.F. Peng

Spring MRS Meeting, San Francisco, CA (17-21 April 1995)

"Directions in Air Force High-Temperature Power Electronics"

K.C. Reinhardt, J.D. Scofield and W.C. Mitchel

Wkshp. on High Temp Electronics for Vehicles, Ft. Monmouth, NJ (26-27 Apr 1995)

"Electronic Properties of Boron in p-type Bulk 6H-SiC"

W.C. Mitchel, M. Roth, A.O. Evwaraye, S.R. Smith and P.W. Yu

Wkshp. on High Temp Electronics for Vehicles, Ft. Monmouth, NJ (26-27 Apr 1995)

"Electro-Optic Response of Doped High-Tg Polyimides"

J.S. Zetts and S.J. Caracci

Am. Phys. Soc. Mtg., OH Sec., Youngstown, OH (12-13 May 95)

FY96 WUDDA, WUD#48-Electronic & Optical Materials-2305FOFJ, November 1995

"Optimization of Absorption in InAs/ InGaSb Superlattices for Long-Wavelength Infrared Detection"
Eric R. Heller, Frank Szmulowicz, Kent Fisher and Frank L. Madarasz
Am. Phys. Soc. Mtg., OH Sec., Youngstown, OH (12-13 May 95)

"Pressure-induced insulator-metal transition in xenon: An LMTO study"
J.G. LePage and M. Alouani
Electronic Structure Wrkshp, St. Mary College, Maryland, 22-24 May (1995)

"Nonlinear Optical Crystal Development at the USAF Wright Laboratory"
F.K. Hopkins, N.C. Fernelius, M.C. Ohmer, D.E. Zelmon and U.B. Ramabadran
National Aerospace Electronics Conference (NAECON), Dayton, OH (22-26 May 1995)

"Interface Roughness Scattering in Thin, Undoped GaInP/GaAs Quantum Wells"
W.C. Mitchel, S. Hegde, S. Elhamri, M. Ahoujja, R.S. Newrock, M. Razeghi and M. Erdtmann
Electron. Matls. Conf., Charlotte, VA (21-23 June 95)

"Deep Levels in p-type Bulk 6H-SiC"
W.C. Mitchel, M. Roth, A.O. Evvaraye, S.R. Smith and P.W. Yu
Electron. Matls. Conf., Charlotte, VA (21-23 June 95)

"High Field Activation of Micropipes in High Resistivity Silicon Carbide"
T.S. Sudarshan, G. Gradinaru, G. Korony, W. Mitchel and R. Hopkins
Electron. Matls. Conf., Charlotte, VA (21-23 June 95)

"Influence of Surface Physisorbed As on the RHEED Intensity Oscillations during Low-Temperature GaAs Molecular Beam Epitaxy"
R. Venkatasubramanian and D. L. Dorsey
Fifth Internat. Conf. on the Formation of Semiconductor Interfaces (ICFSI-5), Princeton, NJ (26-30 June 95)

"Effect of YBCO Substrate on Electromagnetic Properties of Melt-Processed YBCO Superconductor"
G. Kozlowski, C.E. Oberly and I. Maartense
International Cryogenic Materials Conf., Columbus, OH (20 July 1995)

"Persistent photoconductivity in thin undoped GaInP/GaAs quantum wells"
M. Ahoujja, S. Elhamri, D.B. Mast, R.S. Newrock, W.C. Mitchel, G.J. Brown, M. Razeghi and X. He
8th International Conf. on Superlattices, Microstructures and Microdevices (ICSMM-8), Cincinnati, OH (20-25 Aug 95)

"Interface roughness scattering in thin, undoped GaInP/GaAs quantum wells"
S. Elhamri, M. Ahoujja, D.B. Mast, R.S. Newrock, W.C. Mitchel, G.J. Brown, M. Razeghi and X. He
8th International Conf. on Superlattices, Microstructures and Microdevices (ICSMM-8), Cincinnati, OH (20-25 Aug 95)

"Optimization of Absorption in InAs/InGaSb Superlattices for Long Wavelength Infrared Detection"
F. Szmulowicz, E.R. Heller and K. Fisher
8th International Conf. on Superlattices, Microstructures and Microdevices (ICSMM-8), Cincinnati, OH (20-25 Aug 95)

"In Situ Electron Microscopy Study of Structural Transformations on Single Crystal Lanthanum Aluminate"
M. G. Norton, J. Bentley and R. R. Biggers
53rd Annual Meeting of the Microscopy Society of America, Kansas City, MO (Aug 1995)

"Scanning Probe Microscopy Study of the Growth of $\text{YBa}_2\text{Cu}_3\text{O}_7$ Thin Films"
M. G. Norton, R. R. Biggers, E. K. Moser, T. L. Peterson and I. Maartense
53rd Annual Meeting of the Microscopy Society of America, Kansas City, MO (Aug 1995)

"Characterization of Boron in 6H-SiC Using Optical Absorption"
P.W. Yu, K. Mahalingam, W.C. Mitchel, M.D. Roth and D.W. Fischer
22nd International Symposium on Compound Semiconductors, Cheju Island, Korea (28 Aug - 2 Sept 1995)

"Background Limited Performance in p-doped GaAs/GaInPsP Quantum Well Infrared Photodetectors"
J. Hoff, S. Kim, M. Erdtmann, R. Williams, J. Piotrowski, E. Bigan, G.J. Brown and M. Razeghi
22nd International Symposium on Compound Semiconductors, Cheju Island, Korea (28 Aug - 2 Sept 1995)

FY96 WUDDA, WUD#48-Electronic & Optical Materials-2305FOFJ, November 1995

"Improved phase matching predictions based upon mid-IR dispersion data for rubidium titanyl arsenate (RTA)"

Uma B. Ramabadran, Dale L. Fenimore, David E. Zelmon, David Small, Paul Von Richter and Kenneth L. Schepler
Joint Optical Society of America Annual Meeting/Interdisciplinary Laser Science Conference,
Portland, OR (10-15 September 1995)

"Electro-refraction and electro-absorption in poled-polymer films"

N. O'Brien, V. Dominic and S.J. Caracci
Joint Optical Society of America Annual Meeting/Interdisciplinary Laser Science Conference,
Portland, OR (10-15 September 1995)

"Second Harmonic Generation of Short Pulse and Long Pulse CO₂ Laser Radiation"

S. Guha, P.J. Hood and M.C. Ohmer
Joint Optical Society of America Annual Meeting/Interdisciplinary Laser Science Conference,
Portland, OR (10-15 September 1995)

"HTS Thin Film Materials for Advanced Air Force Applications"

T.L. Peterson
AFOSR Superconductivity Workshop, Washington, DC (18 September 1995)

"Microwave characterization of HTS materials using dielectric resonator and power transmission methods"

E.K. Moser
AFOSR Superconductivity Workshop, Washington, DC (18 September 1995)

"Electronic Properties of Semi-insulating Vanadium-doped 6H-SiC"

W.C. Mitchel, M. Roth, A.O. Evvarayye, P.W. Yu, S.R. Smith, J. Jenny, M. Skowronski, H.McD. Hobgood, R.C. Glass, G. Augustine and R.H. Hopkins
6th International Conf. on Silicon Carbide and Related Materials (ICSCRM-95), Kyoto, Japan (18-21 Sept 1995)

"Determination of the Conduction Band Discontinuity in an n-type 3C-SiC/6H-SiC Heterojunction"

S.R. Smith, W.C. Mitchel, A.O. Evvarayye, M.D. Roth, A.J. Steckl and C. Yuan
6th International Conf. on Silicon Carbide and Related Materials (ICSCRM-95), Kyoto, Japan (18-21 Sept 1995)

"Morphology of Two Differently Oriented GaN Grown on (11•0) Sapphire Substrates"

T. Kato, P. Kung, A. Saxler, C.J. Sun, H. Ohsato, M. Razeghi and T. Okuda
Topical Workshop on III-V Nitrides, Nagoya, Japan (21-23 September 1995)

6.6 SUBMITTED/ACCEPTED FOR PRESENTATION IN FY96 (Chronological)

"Photoluminescence Spectroscopy of CdGeAs₂"

J.E. McCrae, R.L. Hengehold, Y.K. Yeo, M.C. Ohmer and P.G. Schunemann
Fall Ohio Section Mtg. of APS, Dayton, OH (6-7 Oct 1995)

"Surface Morphology and Microwave Characterization of Pulsed-Laser Deposited YBaCuO Superconducting Thin Films"

E.K. Moser, R.R. Biggers, I. Maartense, T.L. Peterson, and J.L. Brown
Fall Ohio Section Mtg. of APS, Dayton, OH (6-7 Oct 1995)

"Optical Admittance Spectroscopy of 6H- and 4H SiC"

A.O. Evvarayye, S.R. Smith, and W.C. Mitchel
Fall Ohio Section Mtg. of APS, Dayton, OH (6-7 Oct 1995)

"Observed Transverse Voltage Characteristics of YBCO Superconducting Thin Films"

D.A. Buchanan, T.L. Peterson, I. Maartense and R.R. Biggers
Fall Ohio Section Mtg. of APS, Dayton, OH (6-7 Oct 1995)

"Tailoring the Cutoff Wavelength and Absorption in InAs/InGaSb Superlattices for Long Wavelength Infrared Detection"

E.R. Heller, F. Szmulowicz, and F.L. Madarasz
Fall Ohio Section Mtg. of APS, Dayton, OH (6-7 Oct 1995)

"An Investigation of the Band Gap Properties of InAs/InGaSb Superlattices with Random Layer Widths"

J.W. Thompson and F. Szmulowicz

Fall Ohio Section Mtg. of APS, Dayton, OH (6-7 Oct 1995)

(Invited) "Deep Levels in 6H-SiC as Studied by Admittance Spectroscopy Techniques"

W.C. Mitchel, A.O. Evwaraye and S.R. Smith

Wide BandGap Semiconductors and Device Symposium

188th Electrochemical Soc. Mtg., Chicago, IL (8-13 Oct 1995)

"Characterization of a normal incidence p-doped GaAs/GaInP quantum well intersubband photodetector"

J. Hoff, J. Piotrowski, E. Bigan, M. Razeghi and G.J. Brown

Third International Symposium on Long wavelength Infrared Detectors and Arrays, Physics and Applications

188th Electrochemical Soc. Mtg., Chicago, IL (8-13 Oct 1995)

"Liquid Encapsulated Growth of GaSe"

N.B. Singh, N. Fernelius, F.K. Hopkins, A-X. Zhao and R. Narayanan

6th Eastern Regional Conference of the American Association of Crystal Growth (ACCG/east-95),

Atlantic City, NJ (15-18 Oct 1995)

"Gallium Selenide Crystals for Far-IR NLO Applications"

N. Fernelius, F.K. Hopkins, N.B. Singh, T. Henningsen, V. Balakrishna and R. Narayanan

International Symposium on Growth and Optical Properties of Compound Semiconductors,

Dayton, OH (13-14 Nov 1995)

"MOVPE Growth of High Electron Mobility AlGaN/GaN Heterostructures"

J.M. Redwing, M.A. Tischler, S. Choi, W. Mitchel and A. Saxler

Fall MRS Mtg., Boston, MA (Nov/Dec 1995)

"Electrical and Optical Properties of Defects in n-type 4H-SiC"

A.O. Evwaraye, S.R. Smith and W.C. Mitchel

Fall MRS Mtg., Boston, MA (Nov/Dec 1995)

"High Mobility AlGaN/GaN 2DEG Structures Grown on SiC Substrates"

J.M. Redwing, J.S. Flynn, M.A. Tischler and W.C. Mitchel

Symposium E: III-V Nitride, SiC and Diamond Materials for Electronic Devices

Spring MRS Mtg., San Francisco, CA (8-12 Apr 1996)

Impurity Conduction in n-type 4H-SiC"

A.O. Evwaraye, S.R. Smith and W.C. Mitchel

Spring MRS Mtg., San Francisco, CA (8-12 Apr 1996)

"Thermal and Optical Admittance Spectroscopy studies of Defects in 15R-SiC"

S.R. Smith, A.O. Evwaraye and W.C. Mitchel

Spring MRS Mtg., San Francisco, CA (8-12 Apr 1996)

(Invited) "SiC Devices for DoD Applications"

L.S. Rea

Spring MRS Mtg., San Francisco, CA (8-12 Apr 1996)

"Electronic and Optical Investigation of the Position of Vanadium Impurities in the 4H and 6H SiC Bandgaps"

J.R. Jenny, M. Skowronski, W.C. Mitchel, A.O. Evwaraye, S.R. Smith, H.M. Hobgood, R.C. Glass, G. Augustine and R.H.

Hopkins

Spring MRS Mtg., San Francisco, CA (8-12 Apr 1996)

PUBLICATIONS

FY96 Book

Photodetectors: Materials and Devices, Eds. Gail J. Brown and Manijeh Razeghi,
SPIE Proceedings **2685** (1996).

FY96 Refereed Journal Publications

"Atomistic Calculations of Defects in ZnGeP₂"
P. Zapol, R. Pandey, M.C. Ohmer and J. Gale
J. Appl. Phys. **79**, 671 (1996)

"Optical and Structural Characterization of Triallyl thiourea Cadmium Chloride (ATCC)"
Uma B. Ramabadran, Rama Vuppuladhadium, D. Small, D.E. Zelmon and G.C. Kennedy
Applied Optics **35**, 903 (1996)

"Electro-refraction and Electro-absorption in Poled Polymer Fabry-Perot Etalons"
N.F. O'Brien, V. Dominic and S.J. Caracci
J. Appl. Phys. **79**, 7493 (1996)

"Growth and Characterization of Gallium Selenide Crystals for Far-infrared Conversion Applications"
N.B. Singh, T. Henningsen, V. Balakrishna, D.R. Suhre, N. Fernelius, F.K. Hopkins and D.E. Zelmon
J. of Crystal Growth **163**, 398 (1996)

"Rubidium Titanyl Arsenate Difference Frequency Generation and Validation of New Sellmeier Coefficients"
D.L. Fenimore, K.L. Schepler, D. Zelmon, S. Kuck, U.B. Ramabadran, P. VonRichter and D. Small
J. Opt. Soc. Amer. B **13**, 1 (1996)

"Optical Waveguiding and Morphology of Chitosan Thin Films"
H. Jiang, W. Su, S.J. Caracci, T.J. Bunning, T.M. Cooper and W.W. Adams
J. Appl. Polym. Sci. **61**, 1163 (1996)

"Exciton/Biexciton Energies in Rectangular GaAs/AlGaAs Quantum Well Wires Including Finite Al-graded Band Offsets with Application to Third-order Optical Susceptibilities"
F.L. Madarasz, F. Szmulowicz and F.K. Hopkins
Phys. Rev. B **52**, 8964 (1995)

"Conchoid of Nicomedes from Reflections and Refractions in a Cone"
F. Szmulowicz
Am. J. Phys. **64**, 467 (1996)

"Analysis of Spectral Response in p-type GaAs/GaInP Quantum Well Infrared Photodetectors"
J. Hoff, C. Jelen, S. Slivken, E. Bigan, M. Razeghi and G. J. Brown
Superlatt. Microstruct. **18**, 249 (1995).

"Optimization of Absorption in InAs/InGaSb Superlattices for Long Wavelength Infrared Detection"
F. Szmulowicz, E.R. Heller and K. Fisher
Superlatt. Microstruct. **17**, 373 (1995)

"Response to 'Comment on Resonant Absorption and Photoresponse Measurement in p-type GaAs/AlGaAs Quantum Wells'"
F. Szmulowicz and G. J. Brown
Appl. Phys. Lett. **67**, 3655 (1995)

"Effect of Barrier Material on the Two-Dimensional Electron Gas in δ-doped GaInAs-based Quantum Wells"
I. Lo, W.C. Mitchel, P.W. Yu, A. Fathimulla and H. Hier
Appl. Phys. Lett. **79**, 9196 (1996)

"Interface Roughness Scattering in Thin Quantum Wells"
S. Elhamri, M. Ahoujja, R. Hudgins, D.B. Mast, R.S. Newrock, W.C. Mitchel, M. Razeghi and M. Erdtmann
Superlattices and Microstructures **18**, 75 (1995)

"Persistent Photoconductivity Effect in δ -doped AlInAs/GaInAs Heterostructures"

I. Lo, D.P. Wang, K.Y. Hsieh, T.F. Wang, W.C. Mitchel, M. Ahoujja, J.-P. Cheng, A. Fathimulla and H. Hier
Phys. Rev. B **52**, 14671 (1995)

"The effect of Persistent Photoconductivity in Undoped GaInP/GaAs Quantum Wells"

M. Ahoujja, S. Elhamri, R.S. Newrock, D.B. Mast, W.C. Mitchel, Manijeh Razeghi and M. Erdtman
Superlattices and Microstructures **18**, 147 (1995)

"AlGaN Ultraviolet Photoconductors Grown on Sapphire"

D. Walker, X. Zhang, P. Kung, A. Saxler, S. Javadpour, J. Xu and M. Razeghi
Appl. Phys. Lett. **68**, 2100 (1996)

"Two Dimensional Electron Gas Properties of AlGaN/GaN Heterostructures Grown on 6H-SiC and Sapphire Substrates"

J.M. Redwing, M.A. Tischler, J.S. Flynn, S. Elhamri, M. Ahoujja, R.S. Newrock and W.C. Mitchel
Appl. Phys. Lett. **69**, 963 (1996)

"Determination of the Band Offsets of the 4H-SiC/6H-SiC Heterojunction using the Vanadium Donor (0 $/+$) Level as a Reference"

A. O. Evwaraye, S. R. Smith, and W. C. Mitchel
Appl. Phys. Lett. **67**, 3319 (1995)

"Determination of the Activation Energy ϵ_3 for Impurity Conduction in n-type 4H-SiC"

A.O. Evwaraye, S.R. Smith, W.C. Mitchel and M.D. Roth
Appl. Phys. Lett. **68**, 3159 (1996)

"High Field Effects in High Resistivity Silicon Carbide in Lateral Configurations"

T. S. Sudarshan, G. Gradinaru, G. Korony, W. Mitchel and R. H. Hopkins
Appl. Phys. Lett. **67**, 3435 (1995)

"Time-of-flight Analysis of the Plume Dynamics of Laser-ablated 6H-Silicon Carbide"

M.A. Capano
J. Appl. Phys. **78**, 4790 (1995)

"Electronic Properties of Boron in p-type Bulk 6H-SiC"

W.C. Mitchel, M.D. Roth, A.O. Evwaraye, P.W. Yu and S.R. Smith
J. Electron. Matls. **25**, 863 (1996)

"Optical Admittance Studies of Vanadium Donor Level in High Resistivity p-type 6H-SiC,"

A. O. Evwaraye, S. R. Smith, and W. C. Mitchel
J. Appl. Phys. **79**, 253 (1996)

"Temperature Dependence of the Barrier Height of Metal-semiconductor Contacts on 6H-SiC,"

S. R. Smith, A. O. Evwaraye and W. C. Mitchel
J. Appl. Phys. **79**, 301 (1996)

"Shallow and Deep Levels in n-type 4H-SiC,"

A. O. Evwaraye, S. R. Smith, and W. C. Mitchel
J. Appl. Phys. **79**, 7726 (1996)

"Optical and Electrical Characterization of Boron Impurities in Silicon Carbide Grown by Physical Vapor Transport"

J. R. Jenny, M. Skowronski, W. C. Mitchel, H. M. Hobgood, R. C. Glass, G. Augustine and R. H. Hopkins
J. Appl. Phys. **79**, 2326 (1996)

"Deep Level Transient Spectroscopic and Hall Effect Investigation of the Vanadium Acceptor Level in 4H and 6H SiC"

J.R. Jenny, M. Skowronski, W.C. Mitchel, H.M. Hobgood, R.C. Glass, G. Augustine and R.H. Hopkins
Appl. Phys. Lett. **68**, 1963 (1996)

"High Field Activation of Micropipes in High Resistivity Silicon Carbide"
T.S. Sudarshan, G. Grdinaru, G. Korony, W. Mitchel and R. Hopkins
J. Electron. Mats. **25**, 893 (1996)

FY96 Refereed Conference Proceedings

"Investigation of Second Harmonic Generation in Glutamic Acid-Metal Complexes"
T. M. Cooper, S. M. Cline, D. E. Zelmon, D. Tomlin, R. Vuppuladhadium, S. Das Gupta, and U. Ramabadran
Mat. Res. Soc. Symp. Proc. **417**, (1996)

"Electrical and Optical Properties of Defects in n-type 4H-SiC"
A.O. Evwaraye, S.R. Smith and W.C. Mitchel
Mat. Res. Soc. Symp. Proc. **410**, 57 (1996)

"Background Limited Performance in Aluminum-free p-doped Quantum Well Intersubband Photo-detectors"
J. Hoff, J. Piotrowski, E. Bigan, M. Razeghi and G. J. Brown
Proc. International Symp. on Compound Semiconductors, Inst. Phys. Conf. Ser. No. **145**, 1109 (1996)

"Background Limited Performance in p-Doped GaAs/Ga_{0.71}In_{0.29}As_{0.39}P_{0.61} Quantum Well Infrared Photodetectors"
J. Hoff, C. Jelen, S. Slivken, M. Erdtmann, G. J. Brown, E. Bigan, and M. Razeghi
Proceedings of the Third International Symposium on Long Wavelength Infrared Detectors and Arrays: Physics and Applications, ECS Proc. **95-28**, (1996)

"Characterization of a Normal Incidence p-doped GaAs/Ga_{0.51}In_{0.49}P Quantum Well Intersubband Photodetector"
J. Hoff, J. Piotrowski, E. Bigan, M. Razeghi and G.J. Brown
Proceedings of the Third International Symposium on Long Wavelength Infrared Detectors and Arrays: Physics and Applications, ECS Proc. **95-28**, (1996)

"Electronic and Nonlinear Optical Properties of Excitonic and Biexcitonic Structures in Rectangular GaAs/AlGaAs Quantum Well Wires"
F.L. Madarasz, Frank Szmulowicz and F.K. Hopkins
Proc. of the Third International Symposium on Quantum Confinement: Physics and Applications
ECS Proc. **95-28**, (1996)

"Optical Absorption and Photoresponse in Fully Quaternary p-type Quantum Well Detectors"
J. Hoff, C. Jelen, S. Slivken, G. J. Brown and M. Razeghi
Photodetectors Materials and Devices, ed. G. J. Brown and M. Razeghi
SPIE Proc. **2685**, 62 (1996).

"Determination of the Conduction Band Discontinuity in an n-type 3C-SiC/6H-SiC Heterojunction"
S.R. Smith, A.O. Evwaraye, A.J. Steckl, C. Yuan, W.C. Mitchel and M.D. Roth
Proc. 6th International Conf. on Silicon Carbide and Related Materials (1995), Kyoto, Japan
Inst. Phys. Conf. Ser. **142**, 317 (1996)

"Electronic Properties of Semi-insulating Vanadium-doped 6H-SiC"
W.C. Mitchel, M. Roth, A.O. Evwaraye, P.W. Yu, S.R. Smith, J. Jenny, M. Skowronski, H.McD. Hobgood, R.C. Glass, G. Augustine and R.H. Hopkins
Proc. 6th International Conf. on Silicon Carbide and Related Materials (1995), Kyoto, Japan
Inst. Phys. Conf. Ser. **142**, 313 (1996)

"Characterization of Boron in 6H-SiC Using Optical Absorption"
P.W. Yu, K. Mahalingam, W.C. Mitchel, M.D. Roth and D.W. Fischer
Inst. Phys. Conf. Ser. No **145**, 475 (1996)

"MOCVD Growth of Ga_{1-x}In_xAs_yP_{1-y} - GaAs Quantum Well Structures"
M. Razeghi, J. Hoff, M. Erdtmann, S. Kim, D. Wu, E. Kaas, C. Jelen, S. Slivken, I. Eliashevick, J. Diaz, E. Bigan, G. J. Brown and S. Javadpour
Heterostructure Epitaxy and Devices, Eds. J. Novak & A. Schlachetzki, 229 (Kluwer Academic Publ., Netherlands, 1996)

"Observations on the Growth of YBaCuO Thin Films at Very High Laser Fluences"
R.R. Biggers, M.G. Norton, I. Maartense, T.L. Peterson, E.K. Moser, D. Dempsey and J.L. Brown
Film Synthesis and Growth Using Energetic Beams
Mats. Res. Soc. Symposium Proc. 388, 67 (1995)

FY96 Non-Refereed Publications

"Advances in Nonlinear Optical Crystals for Infrared Laser Sources"
F.K. Hopkins
Proceedings 1996 IRIS Specialty Group on Active Systems, Eglin AFB, FL (14-16 May 1996)

"Relationship of the Second Order Nonlinear Optical Coefficient to Bandgap in Inorganic Non-centrosymmetric Crystals"
A.G. Jackson, M. Ohmer, S.R. LeClair
Wright Laboratory Technical Report WL-TR-95-4098 (1995)

"Published Nonlinear Optical uses of Zinc Germanium Diphosphide"
Nils C. Fernelius
Wright Laboratory Technical Report WL-TR-96-4049 (1996)

"Directions in Air Force High-Temperature Power Electronics"
K.C. Reinhardt, J.D. Scofield and W.C. Mitchel
Wkshp. on High Temp Electronics for Vehicles, eds. G Khalil, H. Singh and T. Podlesak, p.73 (1996)
(US Army Technical Report, published by ARL/AMSRL-WT-NH, Fort Monmouth, NJ)

"Electronic Properties of Boron in p-type Bulk 6H-SiC"
W.C. Mitchel, M. Roth, A.O. Evvaraye, S.R. Smith, P.W. Yu, J. Jenny and M. Skowronski
Wkshp. on High Temp Electronics for Vehicles, eds. G Khalil, H. Singh and T. Podlesak, p.98 (1996)
(US Army Technical Report, published by ARL/AMSRL-WT-NH, Fort Monmouth, NJ)

PRESENTATIONS (Chronological)

"Photoluminescence Spectroscopy of CdGeAs₂"
J.E. McCrae, R.L. Hengehold, Y.K. Yeo, M.C. Ohmer and P.G. Schunemann
Fall Ohio Section Mtg. of APS, Dayton, OH (6-7 Oct 1995)

"Wavelength Dependent Raman Scattering Studies in ZnGeP Single Crystals"
S. Tlali, H.E. Jackson and M.C. Ohmer
Fall Ohio Section Mtg. of APS, Dayton, OH (6-7 Oct 1995)

"Surface Morphology and Microwave Characterization of Pulsed-Laser Deposited YBaCuO Superconducting Thin Films"
E.K. Moser, R.R. Biggers, I. Maartense, T.L. Peterson, and J.L. Brown
Fall Ohio Section Mtg. of APS, Dayton, OH (6-7 Oct 1995)

"Optical Admittance Spectroscopy of 6H- and 4H SiC"
A.O. Evvaraye, S.R. Smith, and W.C. Mitchel
Fall Ohio Section Mtg. of APS, Dayton, OH (6-7 Oct 1995)

"Observed Transverse Voltage Characteristics of YBCO Superconducting Thin Films"
D.A. Buchanan, T.L. Peterson, I. Maartense and R.R. Biggers
Fall Ohio Section Mtg. of APS, Dayton, OH (6-7 Oct 1995)

"Tailoring the Cutoff Wavelength and Absorption in InAs/InGaSb Superlattices for Long Wavelength Infrared Detection"
E.R. Heller, F. Szmulowicz, and F.L. Madarasz
Fall Ohio Section Mtg. of APS, Dayton, OH (6-7 Oct 1995)

"An Investigation of the Band Gap Properties of InAs/InGaSb Superlattices with Random Layer Widths"
J.W. Thompson and F. Szmulowicz
Fall Ohio Section Mtg. of APS, Dayton, OH (6-7 Oct 1995)

(Invited) "Deep Levels in 6H-SiC as Studied by Admittance Spectroscopy Techniques"
W.C. Mitchel, A.O. Evwaraye and S.R. Smith
Wide BandGap Semiconductors and Device Symposium
188th Electrochemical Soc. Mtg., Chigago, IL (8-13 Oct 1995)

"Characterization of a Normal Incidence p-doped GaAs/GaInP Quantum Well Intersubband Photodetector"
J. Hoff, J. Piotrowski, E. Bigan, M. Razeghi and G.J. Brown
Third International Symposium on Long wavelength Infrared Detectors and Arrays, Physics and Applications
188th Electrochemical Soc. Mtg., Chigago, IL (8-13 Oct 1995)

"Background Limited Performance in p-Doped GaAs/Ga_{0.71}In_{0.29}As_{0.39}P_{0.61} Quantum Well Infrared Photodetectors"
J. Hoff, C. Jelen, S. Slivken, M. Erdtmann, G. J. Brown, E. Bigan and M. Razeghi
Third International Symposium on Long wavelength Infrared Detectors and Arrays, Physics and Applications
188th Electrochemical Soc. Mtg., Chigago, IL (8-13 Oct 1995)

(Invited)"Electronic and Nonlinear Optical Properties of Excitonic and Biexcitonic Structures in Rectangular GaAs/AlGaAs Quantum Well Wires"
Frank L. Madarasz, Frank Szmulowicz and F. Kenneth Hopkins
Third International Symposium on Quantum Confinement: Physics and Applications
188th Electrochemical Soc. Mtg., Chigago, IL (8-13 Oct 1995)

"Liquid Encapsulated Growth of GaSe"
R. Narayanan, A-X. Zhao, N.B. Singh, N.C. Fernelius and F.K. Hopkins
6th Eastern Regional Conference of the American Association of Crystal Growth (ACCG/east-95),
Atlantic City, NJ (15-18 Oct 1995)

"MOCVD Growth of Ga_{1-x}In_xAs_yP_{1-y} - GaAs Quantum Structures"
M. Razeghi, J. Hoff, M. Erdtmann, S. Kim, D. Wu, E. Kaas, C. Jelen, S. Slivken, I. Eliashavick, J. Diaz, E. Bigan, G. J. Brown and S. Javadpour
Second International Workshop on Heterostructure Epitaxy and Devices, Slovakia (16-19 Oct 95)

"Gallium Selenide Crystals for Far-IR NLO Applications"
N. Fernelius, F.K. Hopkins, N.B. Singh, T. Henningsen, V. Balakrishna and R. Narayanan
International Symposium on Growth and Optical Properties of Compound Semiconductors,
Dayton, OH (13-14 Nov 1995)

"Photoresponse Studies of the Polarization Dependence of the CdGeAs₂ Band Edge"
G. J. Brown, M. C. Ohmer and P. G. Schunemann
International Symposium on Growth and Optical Properties of Compound Semiconductors,
Dayton, OH (13-14 Nov 1995)

"MOVPE Growth of High Electron Mobility AlGaN/GaN Heterostructures"
J.M. Redwing, M.A. Tischler, S. Choi, W. Mitchel and A. Saxler
Fall MRS Mtg., Boston, MA (Nov/Dec 1995)

"Electrical and Optical Properties of Defects in n-type 4H-SiC"
A.O. Evwaraye, S.R. Smith and W.C. Mitchel
Fall MRS Mtg., Boston, MA (Nov/Dec 1995)

"Solidification Behavior of Binary Organic NLO Crystals:m.NA-CNA and m.NA-p.NA Systems"
N.B. Singh, T. Henningsen, Namwar Singh, O.P. Singh, R.N. Singh, N.P. Singh, F.K. Hopkins, D.E. Zelmon and N.C. Fernelius
National Conf. on Fundamentals of Crystal Growth, Anna Univ., Madras, India (29-30 Jan 1995)

"Growth of Modified GaSe Crystals for Nonlinear Optical Applications"
N.B. Singh, D. Suhre, R. Narayanan, T. Henningsen, B. Balakrishna, D. Coffey, N.C. Fernelius, F.K. Hopkins and D.E. Zelmon
National Conf. on Fundamentals of Crystal Growth, Anna Univ., Madras, India (29-30 Jan 1996)

(Keynote Address)

"Investment in Infrared Technology, Past, Present and Future"

L.E. Brown

SPIE OE/LASE '96, Conference 2685: Photodetectors: Materials and Devices, (1-2 Feb 1996)

"Normal-incidence Long-wavelength Infrared GaAs/GaInAsP Quantum Well Infrared Photodetectors (QWIPs): Theory and Experiment"

J. Hoff, M. Erdtmann, C. Jelen, S. Slivken, E. Bigan, M. Razeghi and G.J. Brown

SPIE OE/LASE '96, Conference 2685: Photodetectors: Materials and Devices, (1-2 Feb 1996)

"UV Photodetectors Based on AlGaN grown by MOCVD"

A. Saxler, D. Walker, X. Zhang, P. Kung, J. Xu and M. Razeghi

SPIE OE/LASE '96, Conference 2685: Photodetectors: Materials and Devices, (1-2 Feb 1996)

"Multiple Subband Population in δ -doped AlAsSb/InGaAs Heterostructures"

M. Ahoujja, S. Elhamri, R.S. Newrock, D.B. Mast, W.C. Mitchel and A. Fathimulla

Bull. Am. Phys. Soc. **41**, 418 (March 1996)

"EPR and ENDOR Study of Ti³⁺ Electron Traps in Hydrothermally grown KTiOPO₄"

S.D. Setzler, G.J. Edwards, M.P. Scripsick, L.E. Halliburton and N.C. Fernelius

Bull. Am. Phys. Soc. **41**, 140 (March 1996)

"Polarized Photoluminescence Study of CdGeAs₂"

J.E. McCrae, R.L. Hengehold, Y.K. Yeo, M.C. Ohmer and P.G. Schunemann

Bull. Am. Phys. Soc. **41**, (March 1996)

"Wavelength Dependent Raman Scattering Studies in ZnGeP₂ Single Crystals"

S. Tlali, H. E. Jackson, M. C. Ohmer, P. G. Schunemann, T. M. Pollak

Bull. Am. Phys. Soc. **41**, (March 1996)

"Atomistic Calculations of Defects in ZnGeP₂"

P. Zapol, R. Pandey, M. Ohmer, J. Gale

Bull. Am. Phys. Soc. **41**, (March 1996)

(Invited) "Silicon Carbide (SiC) Semiconductor Applications- an Air Force Perspective"

L.S. Rea

Symposium E: III-Nitride, SiC and Diamond Materials for Electronic Devices

Spring MRS Mtg., San Francisco, CA (8-12 Apr 1996)

Impurity Conduction in n-type 4H-SiC"

A.O. Evwaraye, S.R. Smith and W.C. Mitchel

Symposium E: III-Nitride, SiC and Diamond Materials for Electronic Devices

Spring MRS Mtg., San Francisco, CA (8-12 Apr 1996)

"Thermal and Optical Admittance Spectroscopy Studies of Defects in 15R-SiC"

S.R. Smith, A.O. Evwaraye and W.C. Mitchel

Symposium E: III-Nitride, SiC and Diamond Materials for Electronic Devices

Spring MRS Mtg., San Francisco, CA (8-12 Apr 1996)

"Electronic and Optical Investigation of the Position of Vanadium Impurities in the 4H and 6H SiC Bandgaps"

J.R. Jenny, M. Skowronski, W.C. Mitchel, A.O. Evwaraye, S.R. Smith, H.M. Hobgood, R.C. Glass, G. Augustine and R.H. Hopkins

Symposium E: III-Nitride, SiC and Diamond Materials for Electronic Devices

Spring MRS Mtg., San Francisco, CA (8-12 Apr 1996)

"Properties of Laser Deposited Epitaxial YBCO Films on Unbuffered MgO and Vicinal cut LaAlO"

L.H. King and R.R. Biggers

Spring MRS Mtg., San Francisco, CA (8-12 Apr 1996)

"Investigation of Second Harmonic Generation in Glutamic Acid-metal Complexes"

T.M. Cooper, S.M. Cline, D. E. Zelmon, D. Tomlin, R. Vuppuladhadium, S. DasGupta and U. Ramabadran
Spring MRS Mtg., San Francisco, CA (8-12 Apr 1996)

(Invited Award Presentation) "Nonlinear Crystal Technology for Improved Lasers"

F.K. Hopkins

Award Presented for *Excellence in Technology Transfer in 1996* for the development and transition of ZnGeP₂ by a team led by WL/MLPO scientists: Dr. M.C. Ohmer, Dr. F.K. Hopkins, Dr. David E. Zelmon, Dr. Nils Fernelius, David W. Fischer, Dr. Kenneth L. Schepler, Dale L. Fenimore, Dr. Margaret H. Ragdowsky, Walter Lauderdale, Dr. David Bliss, Dr. Peter J. Drevinsky, Dr. Yung Kee Yeo, Jack E. McCrae and Michael Greg
Federal Laboratooy Consortium National Technology Transfer Meeting, Seattle, WA (6-9 May 1996)

"Advances in Nonlinear Optical Crystals for Infrared Laser Sources"

F.K. Hopkins

1996 IRIS Specialty Group on Active Systems, Eglin AFB, FL (14-16 May 1996)

"Wavelength Tunable Midwave Infrared Generation"

M.C. Ohmer and P.J. Hood

'96 CLEO/QEL Conference, Anaheim, CA (4-6 June 1996)

"Bandgap Engineering with Ordered Ternary Semiconductors"

G.J. Brown and M.C. Ohmer

28th American Chemical Society Central Regional Mtg., Dayton, OH (9-12 June 1996)

"Investigation of Second Harmonic Generation in Zinc Glutamate"

S.M. Cline, D.E. Zelmon, T.M. Cooper, R. Vuppuladhadium and S.C. Gupta

28th American Chemical Society Central Regional Mtg., Dayton, OH (9-12 June 1996)

"Hopping Conduction in n-type SiC"

W.C. Mitchel, A.O. Evvaraye, S.R. Smith and M. Roth

High Temperature Electronics Conference, Albuquerque, NM (9-14 June 1996)

"Temperature Effects on High Resistivity Silicon Carbide under Pulsed Electric Fields"

G. Gradinaru, G. Korony, T.S. Sudarshan, W.C. Mitchel and H.M. Hobgood

High Temperature Electronics Conference, Albuquerque, NM (9-14 June 1996)

"Theory of Second Harmonic Generation in Periodic Ferroelectric Materials"

D.S. Moroi and D.E. Zelmon

Proc. 16th Int. Liquid Crystal Conf., Kent State U., Kent, OH (24 June 1996)

"Impurity Conduction and Dopant Activation Energy in Highly Doped n-type Bulk SiC"

A.O. Evvaraye, S.R. Smith, W.C. Mitchel and M.D. Roth

38th Electronic Materials Conference, Santa Barbara, CA (26-28 June 1996)

"Two Dimensional Electron Gas Properties of AlGaN/GaN Heterostructures grown by MOVPE on SiC and Sapphire Substrates"

J.M. Redwing, J.S. Flynn, M.A. Tischler, S. Elhamri, M. Ahoujja, R.S. Newrock, W.C. Mitchel and A. Saxler

38th Electronic Materials Conference, Santa Barbara, CA (26-28 June 1996)

"A novel Secular Equation for the Coupled-band Envelope-function Approximation for Superlattices and Application to InAs/InGaSb Superlattices"

F. Szmulowicz

9th Int. Conf. on Superlattices, Microstructures and Microdevices; Satellite Conf. to the 23rd ICPS, Liege, Belgium (14 July 1996)

"Aluminum Free Quantum Well Materials for LWIR Detection"

G. J. Brown, J. Hoff, C. Jelen, S. Slivken and M. Razeghi

IRIS Specialty Group on Infrared Materials, Boulder, CO (24 - 30 July 1996)

"Effects of Doping on NLO Coefficient of GaSe Crystals"

N. B. Singh, D. Shure, V. Balakrishna, R. Narayanan, A. X. Zhao, N. C. Fernelius and F. K. Hopkins

The Ninth International Conference on Vapor Growth & Epitaxy, Vail, CO (4-9Aug 1996)

(Invited) "Advances in Nonlinear Optical Crystals for Next-generation Laser Sources"

F.K. Hopkins

The Tenth American Conf. on Crystal Growth, Vail, CO (5 Aug 1996)

"Heuristic Rules for Group IV Dopant Site Selection in III-V Compounds"

R. Venkatasubramanian, D.L. Dorsey and K. Mahalingam

9th Int. Conf. on MBE, Malibu, CA (5-9 August 1996)

"YAlO₃, a Promising Substrate for HTSC Thin Films and Microwave Applications"

J.S. Derov, A.J. Drehman, R.R. Biggers, B.A. Willemsen and S. Sridhar

Applied Superconductivity Conf., Pittsburgh, PA (25-30 Aug 1996)

"HTS-dielectric Resonators as a Microwave Characterization Tool"

E.K. Moser and K. Naishadham

Applied Superconductivity Conf., Pittsburgh, PA (25-30 Aug 1996)

"Spectral-component Monitoring for Measurement and Control of YBCO Laser Deposition Plumes"

R.R. Biggers, E.K. Moser, I. Maartense, T.L. Peterson, D. Dempsey, C. Varanasi, S. Murray, D. Lubbers, S. Laube, B.

Lovett and P.T. Murray

Applied Superconductivity Conf., Pittsburgh, PA (25-30 Aug 1996)

PUBLICATIONS

FY97 Books/Thesis/Invited Publications & Presentations

(Book)

Photodetectors: Materials and Devices II, Eds. Gail J. Brown and Manijeh Razeghi
SPIE Proceedings **2999** (1997)

(Book Chapter)

"Admittance spectroscopy of 6H, 4H and 15R silicon carbide,"

S. R. Smith, A. O. Evwaraye, and W. C. Mitchel

Silicon Carbide: A Review of Fundamental Questions and Applications to Current Device Technology,
Vol II, eds. W.J. Choyke, H. Matsunami and G. Pensl (Akademie Verlag, Berlin, 1997), Page 227

(Ph.D. Thesis)

"Projector augmented wave method calculation of Ga adatom diffusion and local density of states for GaAs and Si surfaces"

Jeffrey G. LePage

Physics Department, The Ohio State University (1997)

(Special Issue of MRS Bulletin)

Silicon Carbide Electronic Materials and Devices, guest editors M.A. Capano and R.J. Trew
MRS Bulletin **22**, No.3, Materials Research Soc., Pittsburgh, PA (March 1997)

(Special Issue of Physica Status Solidi)

"Admittance spectroscopy of 6H, 4H and 15R silicon carbide"

S.R. Smith, A.O. Evwaraye and W.C. Mitchel

Fundamental Questions and Applications of SiC

Physica Status Solidi(a) **162**, 227 (1997)

"Silicon Carbide (SiC) Semiconductor Applications- an Air Force Perspective"

L.S. Rea

III-Nitride, SiC and Diamond Materials for Electronic Devices

Mat. Res. Soc. Symp. Proc. **423**, 3 (1996)

"Characterization and modeling of GaAs/AlGaAs p-type multi-quantum wells for infrared detection at normal incidence"

G.J. Brown, W.T. Taferner, K.G. Eyink, S.M. Hegde, F. Szmulowicz and S.D. Walck

5th International Symp. on Long Wavelength IR Detectors and Arrays: Physics and Applications. Joint International Mtg. of ECS, Paris, France (31 Aug-5 Sep 1997)

"Spectral component monitoring and control of pulsed laser deposition of YBCO films"

R.R. Biggers, P.T. Murray, D. Mast, I. Maartense, T.L. Peterson, D. Dempsey, C. Varanasi, S. Murray, D. Lubbers, S. Laube, B. Lovett, E.K. Moser, J.L. Brown, D.C. Liptak and J. Busbee
Photonics West (SPIE), San Jose, CA (8-14 Feb 1997)

"Quantitative Modeling of MBE Growth - The Time is Now"

D.L. Dorsey

Workshop on Compound Semiconductor Materials and Devices
San Antonio, TX (16-18 Feb 1997)

"A Review of Ohmic Contacts to Gallium Nitride"

M.A. Capano

International Conference on Metallurgical Coatings and Thin Films, San Diego CA, April 1997

"A Detailed Atomic-Level Simulation of AlGaAs/GaAs (001) Heterointerface Formation"

D.L. Dorsey

U. Nevada - Las Vegas, Las Vegas, NV (12 Sept 1997)

"Emission Spectral-Component Monitoring for Measurement and Control of Pulsed Laser Deposited High Temperature Superconducting Thin Films"

R.R. Biggers

University of Dayton Physics Seminar, University of Dayton (Sep 1997)

"Optimizing the nonlinear semiconductors ZnGeP₂ and CdGeAs₂ for infrared laser applications"

M.C. Ohmer

American Vacuum Soc., OH Chapter 14th North Coast Symp., Cleveland, OH (5 June 1997)

"High Temperature Superconductivity at Wright Laboratory"

T.L. Peterson

Center for Materials Research Faculty Seminar Series, Ohio State University, Columbus, OH (Oct 1996)

"Band Gap Engineered Design of QW and SL Structures for Optimum Performance IR Detectors"

Frank Szmulowicz and Gail J. Brown

University of Alabama at Huntsville (May 22, 1997)

"Current status of nonlinear optical crystal development at USAF Materials Directorate"

N.C. Fernelius, F.K. Hopkins and S.J. Caracci

ACCGE/east-97: Eastern Regional Conf. on Cryst. Growth & Epitaxy, Atlantic City, NJ (28Sept-1 Oct 1997)

FY97 Refereed Journal Publications

"Photoluminescence Study of p-type CdGeAs₂ Ordered Semiconductor Crystals"

J.E. McCrae, R.L. Hengehold, Y.K. Yeo, M.C. Ohmer and P.G. Schunemann

Appl. Phys. Lett. **70**, 455 (1997)

"Influences of temperature and transport properties on the birefringence of CdGeAs₂"

D.W. Fischer, M.C. Ohmer and J.E. McCrae

J. Appl. Phys. **81**, 3579 (1997)

"Temperature Dependence of ZnGeP₂ Birefringence using Polarized Light Interference"

D.W. Fischer and M.C. Ohmer

J. Appl. Phys. **81**, 425 (1997)

"Relationship of the second order nonlinear optical coefficient to energygap in inorganic non-centrosymmetric crystals"

A.G. Jackson, M.C. Ohmer and S.R. LeClair

Infrared Physics & Technology **38**, 233 (1997)

"Theory of second harmonic generation in periodic ferroelectric materials"
D.S. Moroi and D.E. Zelmon
Mol. Cryst. Liq. Cryst. **299**, 97 (1997)

"Improved crystal quality and harmonic generation in GaSe doped with indium"
D.R. Suhre, N.B. Singh, V. Balakrishna, N.C. Fernelius and F.K. Hopkins
Optics Lett. **22**, 775 (1997)

"Infrared corrected Sellmeier coefficients for congruently grown lithium niobate and 5 mol% MgO doped LiNbO₃"
D.E. Zelmon, D.L. Small and D. Jundt
J. Optical Soc. of America B**14**, (1997)

"Rough Sets Applied to Materials Data"
A.G. Jackson, S.R. LeClair, M.C. Ohmer, W. Ziarko and H. Al-Kamhwi
Acta Metallurgica et Materialia **44**, 4475 (1996)

"The origin of Ga desorption transients during AlGaAs/GaAs heterointerface formation by MBE"
K. Mahalingam, D.L. Dorsey, K.R. Evans and Rama Venkat
Appl. Phys. Lett. **70**, 3143 (1997)

"A Stochastic Model for Crystal-amorphous Transition in Low Temperature Molecular Beam Epitaxial Si(111)"
R. Venkatasubramanian, S. Gorantla, S. Muthuvenkatraman and D.L. Dorsey
J. Appl. Phys. **80**, 6219 (1996)

"Heuristic Rules for Group IV Dopant Site Selection in III-V Compounds"
R. Venkatasubramanian, D.L. Dorsey and K. Mahalingam
J. of Crystal Growth **175/176**, 224 (1997)

"A Monte Carlo Study of Gallium Desorption Kinetics during MBE of (100)-GaAs/AlGaAs Heterostructures"
K. Mahalingam, D.L. Dorsey, K.R. Evans and R. Venkatasubramanian
J. of Crystal Growth **175/176**, 211 (1997)

"Gallium desorption behavior at AlGaAs/GaAs heterointerfaces during high-temperature molecular beam epitaxy"
K. Mahalingam, D.L. Dorsey, K.R. Evans and Rama Venkat
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A.O. Evwaraye, S.R. Smith, W.C. Mitchel and H. McD. Hobgood

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"High Voltage Lateral DMOSFETs in 4H-SiC"
J. Spitz, M.R. Melloch, J.A. Cooper, Jr. and M.A. Capano
Inst. Phys. Conf. Ser. (in press)

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E. Sanchez, V.D. Heydemann, G.S. Rohrer, M. Skowronski, J. Solomon, M.A. Capano and W.C. Mitchel
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FY97 Submitted for Publication

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M. Marble, R. Jones, N.B. Singh, V. Balakrishna and N.C. Fernelius

Appl. Optics (Jan 97)

"Bridgman growth of GaSe crystals for nonlinear optical applications"

N.B. Singh, R. Narayanan, A.X. Zhao, V. Balakrishna, D.R. Suhre, N.C. Fernelius and D.E. Zelmon"

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"A theoretical study of native defects in CdGeAs₂"

R. Pandey, M.C. Ohmer and J.D. Gale

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"Refractive index measurements of undoped yttrium aluminum garnet from 0.4 to 5.0 microns"

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I. Lo, S.J. Chen, Y.C. Lee, L-W. Tu, W.C. Mitchel, M. Ahoujja, R.E. Perrin, R.C. Tu, Y.K. Su, W.H. Lan and S.L. Tu

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R. Biggers, I. Maartense, D. Lubbers, S. Laube, S. Murray, D. Dempsey, T.L. Peterson, P.T. Murray, D.B. Mast
Superconductor Science and Technology

FY96 SUBMITTED LIST BELOW

"Reflections and Refractions in a Cone: Conchoid of Nicomedes"
Frank Szmulowicz
Mathematics Magazine

PRESENTATIONS (Chronological)

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"Development of III-Nitride Technology for Optoelectronic Devices"

M. Razeghi and A. Saxler

DARPA/ETO 1996 Optoelectronics Program Reviews: Optical Interconnects/Free Space Optical Interconnects & Short Wavelength Technology, Orlando, FL (7-10 Oct 1996)

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M. Razeghi, X. Zhang, P. Kung, A. Saxler, D. Walker, K.Y. Lim and K.S. Kim

XII Conference on Solid State Physics-Materials Science and Applications

Organized by the Institute of Applied Physics, WAT

Zakopane, Poland (7-12 Oct 1996)

"Structural and microstructural characterization of GaN thin films and GaN-based heterostructures grown on sapphire substrates "

M. Razeghi, A. Saxler, P. Kung, X. Zhang, D. Walker, K.Y. Lim and K.S. Kim

The 8th Seoul International Symposium on the Physics of Semiconductors and Applications - 1996 (ISPSA '96), organized by the Korean Physical Society, KIST, Seoul, Korea (21-22 Oct 96).

"High Temperature Superconductivity at Wright Laboratory"

T.L. Peterson

Center for Materials Research Faculty Seminar Series, Ohio State University, Columbus, OH (Oct 1996)

"Inelastic Light Scattering in Zinc Germanium Diphosphide"

B. H. Bairamov, A. Aydinli, Yu. V. Rud, V. K. Negoduyko, V. V. Toporov, H. Jackson, P. Shunemann, M. Ohmer and N. Fernelius

Symposium O: Infrared Applications of Semiconductors - Materials, Processing and Devices

MRS Fall Mtg. Boston, MA (2-6 Dec 1996)

"First principles calculations of electronic structure of CdGeAs₂"

P. Zapol, R. Pandey and M.C. Ohmer

Symposium O: Infrared Applications of Semiconductors - Materials, Processing and Devices

MRS Fall Mtg. Boston, MA (2-6 Dec 1996)

"Normal Incidence Photoresponse as a Function of Well Width in p-type GaAs/AlGaAs Multi-quantum Wells"

G.J. Brown, K. Eyink, M. Capano, S.M. Hegde and F. Szmulowicz

Symposium O: Infrared Applications of Semiconductors-Materials, Processing and Devices

MRS Fall Mtg. Boston, MA (2-6 Dec 1996)

"GaAs/GaInP quantum well intersubband photodetectors for focal plane array infrared imaging"

C. Jelen, S. Slivken, G.J. Brown and M. Razeghi

Symposium: Infrared Applications of Semiconductors - Materials, Processing and Devices

MRS Fall Mtg. Boston, MA (2-6 Dec 1996)

"InSb detectors and focal plane arrays on GaAs, Si and Al₂O₃ substrates"

E. Michel, H. Mohseni, J. Wojkowski, J. Sandven, J. Xu, M. Razeghi, P. Vu, R. Bredthauer, W.C. Mitchel and M. Ahoujja

Symposium: Infrared Applications of Semiconductors - Materials, Processing and Devices

MRS Fall Mtg. Boston, MA (2-6 Dec 1996)

"Titanium Thin Films on 6H-SiC: The Influence of Carbon on the Reaction of Ti with Silicon Carbide"

M.A. Capano, J.K. Patterson, J.S. Solomon and S.D. Walck

MRS Fall Mtg. Boston, MA (2-6 Dec 1996)

"Electro-optical investigation of micropipes in SiC"

T.S. Sudarshan, H. Moshen, G. Gradinaru, G. Korony and W.C. Mitchel

Symposium: E

MRS Fall Mtg., Boston, MA (2-6 Dec 1996)

"High resolution x-ray diffraction of GaN grown on sapphire substrates"

A. Saxler, M.A. Capano, W.C. Mitchel, P. Kung, X. Zhang, D. Walker and M. Razeghi

Symposium: N- III-V Nitrides

MRS Fall Mtg., Boston, MA (2-6 Dec 1996)

"AlGaN based materials and heterostructures"

P. Kung, A. Saxler, D. Walker, X. Zhang, R. Lavado, K.S. Kim and M. Razeghi

Symposium: N- III-V Nitrides

MRS Fall Mtg., Boston, MA (2-6 Dec 1996)

"Gallium desorption behavior at AlGaAs/GaAs heterointerfaces during high-temperature molecular beam epitaxy"

K. Mahalingam, D.L. Dorsey, K.R. Evans and Rama Venkat

24th Conf. on Phys. & Chem of Semiconductor Interfaces, Research Triangle Park, NC (12-15 Jan 97)

"Characterization of Low Temperature Grown AlSb and GaSb Buffer Layers"

M. L. Seaford, T. W. Haas, D. H. Tomich, K. G. Eyink, W. V. Lampert, S. D. Walck, W. C. Mitchel, and L. F. Eastman

24th Conf. on Phys. & Chem of Semiconductor Interfaces, Research Triangle Park, NC (12-15 Jan 97)

"Very Long Wavelength GaAs/GaInP Quantum well infrared Photodetectors"

C. Jelen, S. Slivken, G.J. Brown and M. Razeghi

Photodetectors: Materials and Devices II, eds. G.J. Brown and M. Razeghi

Photonics West (SPIE), San Jose, CA (8-14 Feb 1997)

"Intrinsic Al_xGa_{1-x}N photodetectors for the entire compositional range"

D. Walker, X. Zhang, A. Saxler, P. Kung, J. Xu and M. Razeghi

Photodetectors: Materials and Devices II, eds. G.J. Brown and M. Razeghi

Photonics West (SPIE), San Jose, CA (8-14 Feb 1997)

"Spectral component monitoring and control of pulsed laser deposition of YBCO films"
R.R. Biggers, P.T. Murray, D. Mast, I. Maartense, T.L. Peterson, D. Dempsey, C. Varanasi, S. Murray,
D. Lubbers, S. Laube, B. Lovett, E.K. Moser, J.L. Brown, D.C. Liptak and J. Busbee
Photonics West (SPIE), San Jose, CA (8-14 Feb 1997)

"Quantitative Modeling of MBE Growth - The Time is Now"
D.L. Dorsey
Workshop on Compound Semiconductor Materials and Devices
San Antonio, TX (16-18 Feb 1997)

"Raman spectroscopy for determining YBCO thin film parameters *in situ*"
J.D. Busbee, D.P. Lubbers, A.G. Jackson, R.R. Biggers, D.C. Liptak and I. Maartense
Symposium: Applications of Sensors in Materials Processing
TMS Annual Mtg, Orlando, FL (Feb 1997)

"Heteroepitaxial AlGaN films for ultraviolet photodetector applications"
A. Saxler, P. Kung, D. Walker, X. Zhang and M. Razeghi
4th Wide Bandgap and Nitride Workshop, St. Louis, MO (11-14 March 1997)

"Calculation of Ga adatom diffusion on GaAs (001)-c(4x4)"
J.G. LePage, M. Alouani, J.W. Wilkins and P.E. Blöchl
Am. Phys. Soc. March Mtg., Kansas City, MO (17-21 Mar 1997)

"Numerically-stable Hermitian secular equation for the envelope-function approximation for superlattices"
F. Szmulowicz
Am. Phys. Soc. March Mtg., Kansas City, MO (17-21 Mar 1997)

"Photoluminescence investigation of p-type GaAs/AlGaAs quantum well infrared detectors (QWIPs)
designed for normal incidence detection in the 10 micron region"
S.M. Hegde, G.J. Brown, M.A. Capano and K. Eyink
Am. Phys. Soc. March Mtg., Kansas City, MO (17-21 Mar 1997)

"AlGaN/GaN heterostructures: effective mass"
M. Ahoujja, S. Elhamri, R.S. Newrock, D.B. Mast, W.C. Mitchel, J.M. Redwing, M.A. Tscherl and J.S.
Flynn
Am. Phys. Soc. March Mtg., Kansas City, MO (17-21 Mar 1997)

"2-20 micron NLO materials"
N.C. Fernelius
Laser Standoff (Remote) Detection Team Meeting, Edgewood RD&E Center, Aberdeen Proving Ground,
MD (2 April 1997)

"Silicon Carbide (SiC) Semiconductor Applications- an Air Force Perspective"
L.S. Rea
III-Nitride, SiC and Diamond Materials for Electronic Devices
MRS Spring Mtg., San Francisco, CA (8-12 April 1997)

"Thermal and optical admittance spectroscopy studies of defects in 15R-SiC"
S.R. Smith, A.O. Evwaraye and W.C. Mitchel
Symposium: III-Nitride, SiC and Diamond Materials for Electronic Devices
MRS Spring Mtg., San Francisco, CA (8-12 April 1997)

"Impurity Conduction in n-type 4H-SiC as a Function of the Shallow Dopant Density"
S. R. Smith, A. O. Evwaraye and W. C. Mitchel
Symposium: Defects in Electronic Materials
MRS Spring Mtg., San Francisco, CA (8-12 April 1997)

"Pulsed laser deposition of YBaCuO thick films with Ag additions"
C. Varanasi, R. Biggers, I. Maartense, E.K. Moser, D. Dempsey, D. Liptak, J. Busbee, G. Kozlowski, R. Nekkanti, T.L. Peterson and C.E. Oberly
MRS Spring Mtg., San Francisco, CA (31 Mar-4 Apr 1997)

"RF Sputtering of Biaxially-Textured YSZ Buffer Layer on Angular Oriented Metallic Substrate"
G. Kozlowski, G. Farlow, J. Hundley, C. Varanasi, R.R. Biggers, I. Maartense, R. Nekkanti, E.K. Moser, C.E. Oberly, T.L. Peterson, V. Selvamanickam, A. Ivanova, and A.E. Kaloyerous
MRS Spring Mtg., San Francisco, CA (31 Mar-4 Apr 1997)

"A Review of Ohmic Contacts to Gallium Nitride"
M.A. Capano
International Conf. on Metallurgical Coatings and Thin Films, San Diego CA (April 1997)

"Future tools for the mastery of light"
F.K. Hopkins
Physics Dept. Seminar, Northern KY Univ. (18 April 1997)

"Environmental testing of long wave infrared (LWIR) windows"
E.S. Kelly, R.J. Ondercin, J.A. Detrio and P.R. Greason
SPIE 11th Aerosense Conf on Window and Dome Technologies and Matls, Orlando, FL (20-25 April 1997)

"Diamond coated ZnS for improved erosion resistance"
R. Korenstein, L. Goldman, R. Hallock, R. Ondercin and E. Kelly
SPIE 11th Aerosense Conf on Window and Dome Technologies and Matls, Orlando, FL (20-25 April 1997)

"Refractive index measurements of barium titanate and implications for periodically QPM devices"
D.L. Small, D.E. Zelmon, L.E. Myers and P. Schunemann
Am. Phys. Soc., Ohio Section, Bolling Green State U., OH (2-3 May 1997)

"Effects of In doping on GaSe crystal quality and second harmonic generation"
N.C. Fernelius, F.K. Hopkins, D.R. Suhre, N.B. Singh and V. Balakrishna
Am. Phys. Soc., Ohio Section, Bolling Green State U., OH (2-3 May 1997)

"Dependence of nonlinear absorption in CdGeAs₂ on temperature, orientation and charge carrier density"
S. Guha, M.C. Ohmer and P.J. Hood and P.G. Schunemann
CLEO/QELS, Baltimore, MD (18-23 May 1997)

"Band Gap Engineered Design of QW and SL Structures for Optimum Performance IR Detectors"
Frank Szmulowicz and Gail J. Brown
University of Alabama at Huntsville (May 22, 1997)

"Current polymer research efforts at Wright Patterson AFB"
S. Caracci
1997 ONR/AFOSR Polymer Program Review, Jacksonville Fl (June 1997)

"Optimizing the nonlinear semiconductors ZnGeP₂ and CdGeAs₂ for infrared laser applications"
M.C. Ohmer
American Vacuum Soc., OH Chapter 14th North Coast Symp., Cleveland, OH (5 June 1997)

"Deep levels due to vanadium in SiC"
W.C. Mitchel
1997 Awards Day Colloquium, Dept of Physics, U of Cincinnati, Cincinnati, OH (5 June 1997)

"Operational characteristics of organic crystals for NLO and EO applications"
N.B. Singh, T. Rajalakshmi, I. Liberman, N. Fernelius, F.K. Hopkins and D.E. Zelmon
Electronics Materials Conf., Fort Collins, CO (25-27 June 1997)

"Microwave characterization of high temperature superconductor films using dielectric resonator measurements"
K. Naishadham and E.K. Moser
Institute of Electrical and Electronic Engineers, Montreal, Canada (13-18 July 1997)

"Emission spectral-component monitoring for measurement and control of pulsed laser deposited HTS thin films"
R.R. Biggers, J.D. Busbee and D. Lubbers
Australasia-Pacific Forum on Intelligent Processing & Manufacturing of Materials (IPMM-97), Sidney, Australia (14-17 July 1997)

"Toward in-situ control fro PLD of YBa₂Cu₃O_{7-x} thin films utilizing Raman spectroscopy"
J. Busbee, D. Liptak, R. Biggers, I. Maartense, C. Varanasi
Australasia-Pacific Forum on Intelligent Processing & Manufacturing of Materials (IPMM-97), Sidney, Australia (14-17 July 1997)

"Nonlinear optical materials for frequency conversion and optical signal processing"
S.J. Caracci, N.C. Fernelius, M.C. Ohmer, D.E. Zelmon and J.S. Zetts
Phillips Laboratory 6th Annual Technical Interchange Symposium, Kirtland AFB, NM (16 July 1997)

"Thermal activation energies for the three in-equivalent lattice sites for the B_{Si} acceptor in 6H-SiC"
A.O. Evwaraye, S.R. Smith, W.C. Mitchel and H. McD. Hobgood
International Conf. on Defects in Semiconductors (ICDS-97), Aveiro, Portugal (21-25 July 97)

"GaN grown using trimethylgallium and triethylgallium"
A. Saxler, P. Kung, X. Zhang, D. Walker, J. Solomon, W.C. Mitchel and M. Razeghi
International Conf. on Defects in Semiconductors (ICDS-97), Aveiro, Portugal (21-25 July 97)

“Electroluminescence of III-Nitride double heterostructure light emitting diodes with silicon and magnesium doped InGaN”

A. Saxler, K.S. Kim, D. Walker, P. Kung, X. Zhang, G.J. Brown, W.C. Mitchel and M. Razeghi
International Conf. on Defects in Semiconductors (ICDS-97), Aveiro, Portugal (21-25 July 97)

“GaN doped with sulfur”

A. Saxler, P. Kung, X. Zhang, D. Walker, J. Solomon, M. Ahoujja, W.C. Mitchel, H.R. Vydyanath and M. Razeghi

International Conf. on Defects in Semiconductors (ICDS-97), Aveiro, Portugal (21-25 July 97)

“Combined Effects Testing of Long Wave Infrared (LWIR) Window Materials”

E. S. Kelly, R. J. Ondercin, J. A. Detrio, and L. M. Goldman

1997 Meeting of IRIS Specialty Group on Infrared Materials

Naval Post-Graduate School, Monterey, CA (28-29 July 1997)

“LANTIRN IR Window Evaluation Protocol”

J. A. Detrio, N. R. Osborne, E. S. Kelly, and R. J. Ondercin

1997 Meeting of IRIS Specialty Group on Infrared Materials

Naval Post-Graduate School, Monterey, CA (28-29 July 1997)

“Runway Debris Damage to LWIR Windows - Single Sand Particle Impact Damage”

J. A. Detrio, R. S. Bertke, L. M. Goldman, E. S. Kelly, and R. J. Ondercin

1997 Meeting of IRIS Specialty Group on Infrared Materials

Naval Post-Graduate School, Monterey, CA (28-29 July 1997)

“Durable Bonded Claddings for Aircraft IR Transparencies”

A. B. Harker, L. M. Goldman, R. Korenstein, R. J. Ondercin and E. S. Kelly

1997 Meeting of IRIS Specialty Group on Infrared Materials

Naval Post-Graduate School, Monterey, CA (28-29 July 1997)

“Characterization and modeling of GaAs/AlGaAs p-type multi-quantum wells for infrared detection at normal incidence”

G.J. Brown, W.T. Taferner, K.G. Eyink, S.M. Hegde, F. Szmulowicz and S.D. Walck

5th International Symp. on Long Wavelength IR Detectors and Arrays: Physics and Applications. Joint International Mtg. of ECS, Paris, France (31 Aug-5 Sep 1997)

“Deep levels in SiC:V and high temperature transport measurements”

W.C. Mitchel, R.E. Perrin, J. Goldstein, M. Roth, M. Ahoujja, S.R. Smith, A.O. Evvaraye, J. Solomon, G. Landis, J. Jenny, Mc.D. Hobgood, G. Augustine and V. Balakrishna

International Conf. on SiC, III-Nitrides and Related Materials, Stockholm, Sweden (1-5 September 1997)

“Phonon spectrum of band-to-band optical transitions in 6H-SiC as determined by optical admittance spectroscopy”

S.R. Smith, A.O. Evvaraye and W.C. Mitchel

International Conf. on SiC, III-Nitrides and Related Materials, Stockholm, Sweden (1-5 September 1997)

"Structural characterization of SiC crystals grown by physical vapor transport"
E. Sanchez, G.S. Rohrer, M. Skowronski, J. Solomon, M.A. Capano and W. C. Mitchel
International Conf. on SiC, III-Nitrides and Related Materials, Stockholm, Sweden (1-5 September 1997)

"Minority Carrier Lifetime Measurements in 6H-SiC Using the Photoconductive Decay Techique"
W. Zhou, I. Khlebnikov, T. S. Sudarshan, M. A. Capano, and W. C. Mitchel
International Conf. on SiC, III-Nitrides and Related Materials, Stockholm, Sweden (1-5 September 1997)

"A comprehensive atomic-level simulator for AlGaAs/GaAs (001) MBE"
D.L. Dorsey, K. Mahalingam and R. Venkat
24th International Symp. on Compound Semiconductors - IEEE, San Diego, CA (7-11 September 1997)

"A Detailed Atomic-Level Simulation of AlGaAs/GaAs (001) Heterointerface Formation"
D.L. Dorsey
U. Nevada - Las Vegas, Las Vegas, NV (12 Sept 1997)

"Emission Spectral-Component Monitoring for Measurement and Control of Pulsed Laser Deposited High Temperature Superconducting Thin Films"
R.R. Biggers
University of Dayton Physics Seminar, University of Dayton (11 September 1997)

"Modified GaSe crystals for 2-5 and 8-14 μm wavelength applications"
N.B. Singh, D.R. Suhre, T. Rajalakshmi, R. Narayanan, V. Balakrishna, M.L. Marable, P.H. Mui, R. Jones, N.C. Fernelius, S.J. Caracci, F.K. Hopkins and D.E. Zelmon
ACCGE/east-97: East. Regional Conf. on Cryst. Growth & Epitaxy, Atlantic City, NJ (28Sept-1 Oct 1997)

"Current status of nonlinear optical crystal development at USAF Materials Directorate"
N.C. Fernelius, F.K. Hopkins and S.J. Caracci
ACCGE/east-97: Eastern Regional Conf. on Cryst. Growth & Epitaxy, Atlantic City, NJ (28Sept-1 Oct 1997)

"Pixelless infrared imaging using quantum wells"
G.J. Brown and F. Szmulowicz
AGARD 7th Symp. on Multi-Sensor Systems and Data Fusion for Telecommunications, Remote Sensing and Radar, Lisbon, Portugal (29 Sep-2 Oct 1997)

"Nonlinear optical frequency conversion materials for multi-band remote sensing and surveillance"
S. Caracci, N. Fernelius, M. Ohmer and D. Zelmon
AGARD 7th Symp. on Multi-Sensor Systems and Data Fusion for Telecommunications, Remote Sensing and Radar, Lisbon, Portugal (29 Sep-2 Oct 1997)

Papers Submitted/Accepted for Presentation in FY98

"Influence of Host Environment on the Poling Characteristics and Chromophore-Chromophore Interactions in Electro-Optic Guest-Host Polymer Systems"
M. D. Alexander Jr., R. A. Vaia, M. Banach, S. J. Caracci, B. Reinhardt and R. Spry
MRS Fall Mtg. Boston, MA (1-5 Dec 1997)

"Operational characteristics of GaSe crystals for mid-IR and far-IR applications"

N.C. Fernelius, F.K. Hopkins, N.B. Singh, D. Suhre, M. Marable, R.H. Hopkins, R. Meyer and P. Mui

Symposium F: Infrared Applications of Semiconductors II

MRS Fall Mtg. Boston, MA (1-5 Dec 1997)

"Frequency doubling of CW and pulsed CO₂ lasers using diffusion-bonded, quasi-phase-matched GaAs stacks"

Symposium F: Infrared Applications of Semiconductors II

M.C. Ohmer, S. Guha, R.E. Perrin, L.S. Rea, P.W. Yu and A. Fathimulla

MRS Fall Mtg. Boston, MA (1-5 Dec 1997)

"Modeling of the properties of dopants in ZnGeP₂"

R. Pandey, M.C. Ohmer, J.M. Recio and A. Costales

Symposium F: Infrared Applications of Semiconductors II

MRS Fall Mtg. Boston, MA (1-5 Dec 1997)

"Laser damage studies of silver gallium sulfide single crystals"

W. Ruderman, J. Maffetone and D.E. Zelmon

Symposium F: Infrared Applications of Semiconductors II-NonLinear optical and OPO Materials

MRS Fall Mtg. Boston, MA (1-5 Dec 1997)

"Refractive index measurements of barium titanate from 0.4 to 5.0 microns and implications for periodically poled frequency conversion devices"

D.E. Zelmon, D.L. Small and P. Schunemann

Symposium F: Infrared Applications of Semiconductors II

MRS Fall Mtg. Boston, MA (1-5 Dec 1997)

"Characterization of CdGeAs₂ using capacitance methods"

S.R. Smith, A.O. Evvaraye and M.C. Ohmer

Symposium F: Infrared Applications of Semiconductors II

MRS Fall Mtg. Boston, MA (1-5 Dec 1997)

"Polarized Raman scattering studies of chalcopyrite ZnGeP2 single crystals"

S. Tlali, H.E. Jackson, M.C. Ohmer, P.G. Schunemann and T.M. Pollak

Symposium F: Infrared Applications of Semiconductors II

MRS Fall Mtg. Boston, MA (1-5 Dec 1997)

"ENDOR characterization of the zinc vacancy in anic germanium diphosphide"

K.T. Stevens, S.D. Setzler, L.E. Halliburton, N.C. Fernelius, P.G. Schunemann and T.M. Pollak

Symposium F: Infrared Applications of Semiconductors II

MRS Fall Mtg. Boston, MA (1-5 Dec 1997)

"Photoresponse studies of the polarization dependence of the cadmium germanium arsenide band edge"

G.J. Brown, M.C. Ohmer and P.G. Schunemann

Symposium F: Infrared Applications of Semiconductors II

MRS Fall Mtg. Boston, MA (1-5 Dec 1997)

"Mid-IR photodetectors based on InAs/InGaSb type-II quantum wells"

G.J. Brown, M. Ahoujja, F. Szmulowicz, W.C. Mitchel and C.H. Lin

Symposium F: Infrared Applications of Semiconductors II

MRS Fall Mtg. Boston, MA (1-5 Dec 1997)

"Spectral component monitoring of the plumes generated during deposition of Re(Y,Nd)BaCuO films by pulsed laser ablation"

R. Biggers, C. Varanasi, I. Maartense, D. Dempsey, D. Mast, D. Liptak, J. Jones, T.L. Peterson, T. Murray and J. Busbee

Symposium II: In Situ Process Diagnostics and Intelligent Materials Processing

MRS Fall Mtg. Boston, MA (1-5 Dec 1997)

(Invited)

"Calculation and photoresponse measurement of the long-wavelength IR absorption in p-type GaAs/AlGaAs quantum wells and type-II InAs/InGaSb superlattices"

F. Szmulowicz, G.J. Brown, W.C. Mitchel, H.C. Liu, L. Li, M. Buchanan, Z.R. Wasilewski and C.H. Lin
International Workshop on Intersubband Transitions in Quantum Wells: Physics and Devices, Tainan, Taiwan (15-18 Dec 97)

"New developments in III-Nitride material and device applications"

M. Razeghi, A. Saxler, P. Kung, D. Walker, X. Zhang, K.S. Kim, H.R. Vydyanath, J. Solomon, M. Ahoujja and W.C. Mitchel

9th International Workshop on Physics of Semiconductor Devices (IWPSD), Delhi, India (16-20 Dec 97)

"Novel theoretical investigation of As⁰_{Ga} and As⁺_{Ga} incorporation in low temperature MBE of GaAs: Surface dynamics and Be influence"

K. Natarajan, R. Venkat and D.L. Dorsey

Physics and Chemistry of Semiconductor Interfaces (PCSI-25), Salt Lake City, UT (18-25 Jan 98)

"Sm₂(Co, Fe, Cu, Zr)₁₇ magnets with improved thermal stability"

C.H. Chen, M.S. Walmer, M.H. Walmer, S. Liu, E. Kuhl and G. Simon

7th Joint MMM-Conf., Sponsored by the Amer. Institute of Phys., San Francisco, CA (6-9 January 1998)

"A one parameter model of heterointerface formation"

D.L. Dorsey, K. Mahalingam and R. Venkat

PCSI-25, Sponsored by the Am. Vac. Soc., Salt Lake City, UT (18-25 January 1998)

"Mid-infrared photodetectors based on the InAs/InGaSb type-II superlattice"

C.H. Lin, G.J. Brown, W.C. Mitchel, M. Ahoujja and F. Szmulowicz

Photodetectors: Materials and Devices III

SPIE Photonics West 98, San Jose, CA (28-30 Jan 1998)

"Growth and characterization of InAs/GaSb type-II superlattice for long wavelength infrared detectors"

H. Mohseni, E.J. Michel, M. Razeghi, W.C. Mitchel and G.J. Brown

Photodetectors: Materials and Devices III

SPIE Photonics West 98, San Jose, CA (28-30 Jan 1998)

"Responsivity and noise performance of InGaAs/InP quantum well infrared photodetectors grown by gas-source molecular beam epitaxy"

C. Jelen, S. Slivken, T. David, M. Razeghi and G.J. Brown

Photodetectors: Materials and Devices III

SPIE Photonics West 98, San Jose, CA (28-30 Jan 1998)

"Optical Absorption and photoluminescence in AgGaTe₂"

J. Goldstein, M.C. Ohmer, C. Hegde, P. Schunemann and T. Pollak

APS March Mtg., Los Angeles, CA (16-20 Mar 98)

"Optical Absorption and photoluminescence in CdS_xSe_{1-x}:V"

J. Goldstein, M.C. Ohmer, C. Hegde, K-T Chen, Y-F Chen, S. Morgan and A. Burger

APS March Mtg., Los Angeles, CA (16-20 Mar 98)

"The effect of doping on nitrogen activation energy levels in 4H-SiC"

A.O. Exwaraye, S.R. Smith and W.C. Mitchel

MRS Spring Mtg., San Francisco, CA (12-17 April 1998)

"Aluminum acceptors in inequivalent sites in 4H-SiC"

A.O. Exwaraye, S.R. Smith and W.C. Mitchel

MRS Spring Mtg., San Francisco, CA (12-17 April 1998)

"Investigation of transition metal-xanthate complexes for nonlinear optical application"

D.E. Zelmon, Z. Gebeyehu, D. Tomlin and T.M. Cooper

Symposium O: Hybrid Materials

MRS Spring Mtg., San Francisco, CA (12-17 April 1998)

"An Evaluation of Combined Effects Test Conditions"

E. S. Kelly, R. J. Ondercin, J. A. Detrio, and L. M. Goldman

7th DoD Electromagnetic Window Symposium

Applied Physics Laboratory, Laurel Maryland (5-7 May 1998)

"Substrate Protection of Bonded Windows"

E. S. Kelly, R. J. Ondercin, A. B. Harker, L. M. Goldman, and J. A. Detrio

7th DoD Electromagnetic Window Symposium

Applied Physics Laboratory, Laurel Maryland (5-7 May 1998)

"Repairable LANTIRN IR Windows"

L. M. Goldman, A. B. Harker, R. Korenstein, J. K. Rawson, R. J. Ondercin, and E. S. Kelly

7th DoD Electromagnetic Window Symposium

Applied Physics Laboratory, Laurel Maryland (5-7 May 1998)

"The 1.1 eV deep level in 4H-SiC"

W.C. Mitchel, R.E. Perrin, J. Goldstein, S.R. Smith, J.S. Solomon, A.O. Exwaraye, G. Augustine and V. Balakrishna

10th Conference on Semiconducting and Insulating Materials, Berkeley, CA (1-5 June 1998)

"Multi-layer conduction in epitaxial InSb grown on GaAs substrates"

M. Ahoujja, W.C. Mitchel, E. Michel and M. Razeghi

10th Conference on Semiconducting and Insulating Materials, Berkeley, CA (1-5 June 1998)

"Modified GaSe crystals for mid-IR applications"

N.B. Singh, D.R. Suhre, R.H. Hopkins, M. Marable, R. Meyer, R. Narayanan, N.C. Fernelius, F.K. Hopkins and D.E. Zelmon

International Conf. on Crystal Growth, Jerusalem, Israel (26-31 July 98)